THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XIX. No. 454—22ND YEAR.] LONDON, MARCH 15, 1870. [Subscription per Annum. 15s. in Advance. 18s. Credit.] DOUBLE NO. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—
10,000 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
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PARIS EXHIBITION, 1867.

THE TESTING-HOUSE REPORTS.

The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1860, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."

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PATENTS FOR CHARGING AND DRAWING GAS-RETORTS,

WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

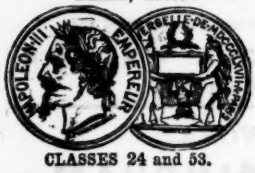
Gas Engineers are solicited to examine into the merits of this invention before erecting new or altering old retort-houses. It may be seen in action at the Alliance Gas Company's Works, Dublin, where its utility and economy will be clearly demonstrated. Although the saving in labour will be considerable, and quickly return any outlay of capital, there are other and important features strongly recommending its adoption at all gas-works, and which a gas engineer upon examination will at once appreciate.

The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

Drawings, &c., may be seen at our Office, and all details explained.

JOHN CHISHOLM, SON, & CO., 44, MARK LANE, E.C.

PARIS, 1867.



CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

CLASSES 13 and 31.

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HENRY ALDER,

GRANGE METER-WORKS, EDINBURGH,

Begs to intimate that he is the ORIGINAL MANUFACTURER of

DRY GAS-METERS IN CAST-IRON CASES.

The Meters are protected by Registration on the 17th of December, 1864, under the "Copyright of Designs Act."

They are much more durable, and at the same time more easily repaired than those in Tin Cases.

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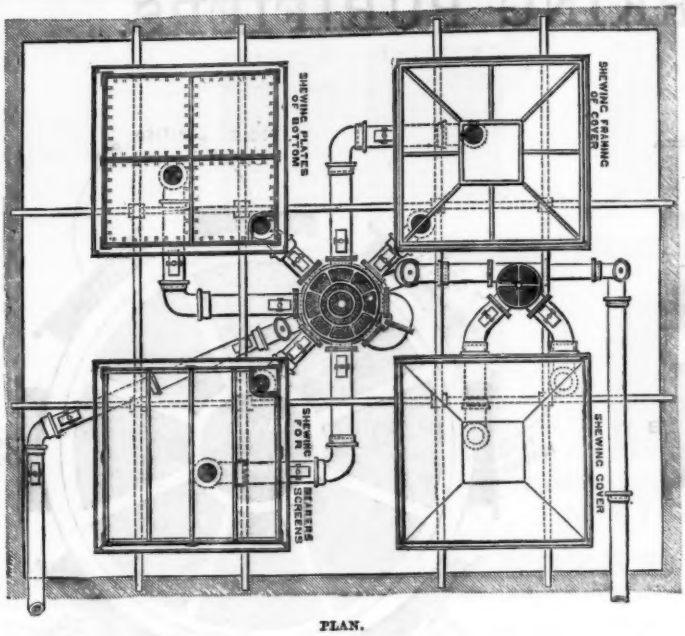
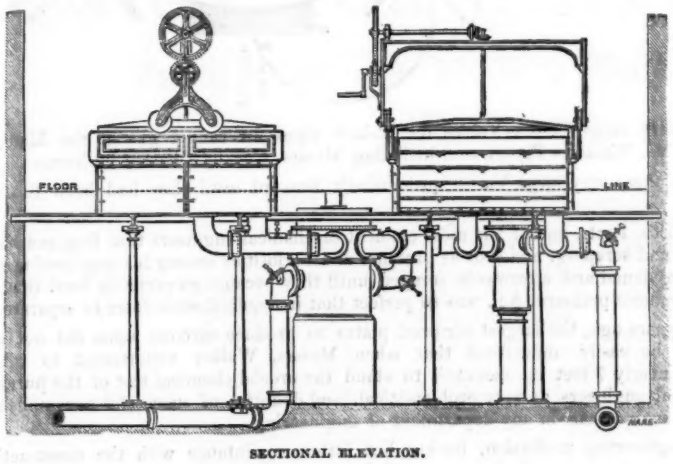
A PLAN & ELEVATION OF GAS PURIFIERS WITH COCKEY'S PATENT VALVES.



PLAN.



SECTIONAL ELEVATION.

DESCRIPTION OF PURIFIER ARRANGEMENT.

The plan shows four Purifiers: three of them are worked in rotation by means of a central Valve, so that two are always in use, and the third always out of use for cleaning. By another arrangement of the Valve, either one, two, or three Purifiers may be used together.

The fourth Purifier is used as a guard, with a separate Valve, and is useful in preventing any slightly impure gas, which may have escaped in turning the central Valve, passing in that state to the gasholder.

This system has been found to work well in many gas-works, and in addition to the advantage before stated, it affords a ready and convenient mode of using oxide and lime together for purifying.

By the introduction of a bye-pass, the system is made more perfect, inasmuch as the central Valve, with its connected Purifiers, may be shut off for repair, and the gas passed temporarily direct to the fourth Purifier.

The Valves which are here introduced have now been in use for more than ten years, and have been tested in sizes varying from 3-inch to 16-inch. The increasing demand for them is the best proof which can be given of their satisfactory working and general usefulness.

More than 350 of them have been fixed. They are suited for various parts of gas apparatus, and are especially available for bye-pass connexions. They are also introduced with much advantage for the inlet and outlet connexions of gasholders, and simplify very much the changes where more than one gasholder is in use.

They are durable and easily reground without removal from their connexions, and in a few hours they may be made as good as new after many years wear.

The patentees are prepared to furnish plans, specifications, and estimates, either for the entire construction and erection of gas-works, or for the rearrangement of any part of the apparatus. The Valves are manufactured at the works, at Frome, where also Gasholders, Purifiers, Steam-Engines and Exhausters, Governors, and all other descriptions of Gas Apparatus are made and supplied.

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PURIFIERS, CONDENSERS, & SCRUBBERS erected complete, or the materials supplied; and every description of goods in use by Gas-Works, in stock, at wholesale prices, at
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Superior quality, constantly ON SALE at
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N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
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C. & W. WALKER'S PATENT DRY CENTRE-VALVE

FOR WORKING PURIFIERS.

FIG. 1.

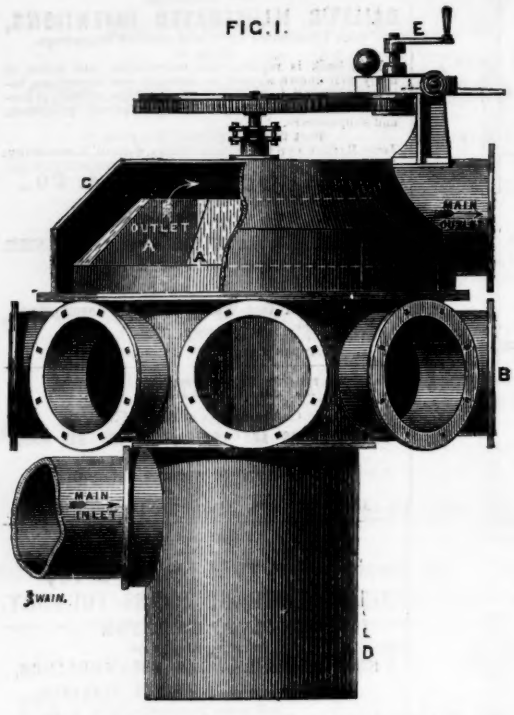
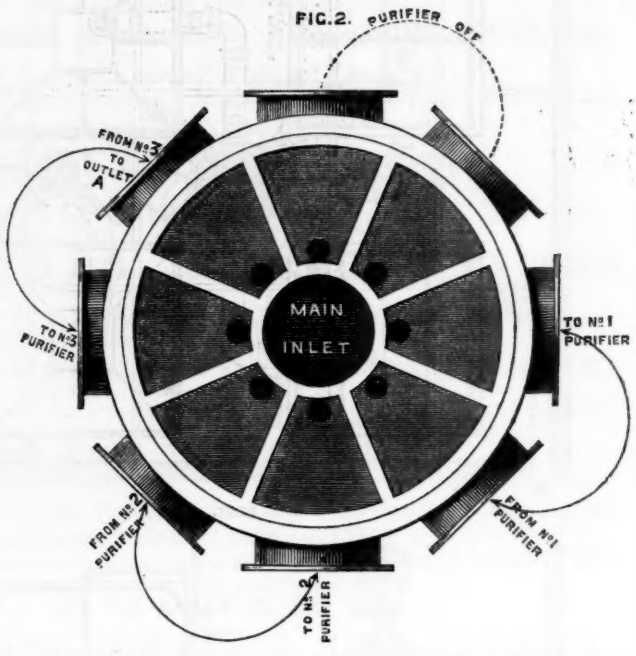


FIG. 2.



The above drawings are illustrations of two very large Centre-Valves for 22-inch pipes for cannel gas at the Manchester Corporation Gas-Works, made under Messrs. C. and W. Walker's Patent, and including Messrs. Cockey's Patent by licence.

C. & W. Walker have refrained from bringing these very large Valves prominently forward until they had been thoroughly tested by time and working.

It is about 25 years ago since Sir Joseph Whitworth, Bart., one of the most eminent mechanical engineers that England has ever produced, made perfect surfaces upon iron by planing and scraping, and sent as presents and curiosities among his engineering friends two small pieces of surfaced cast iron, which had been planed and afterwards scraped until they became so perfectly level that, when pressed together with the hands, the contact by atmospheric pressure, &c., was so perfect that it required some force to separate them.

Subsequently, even so recently as ten or twelve years ago, the largest surfaced plates to produce surfaces upon did not exceed about 3 feet 6 inches square. From this it will be easily understood that when Messrs. Walker volunteered to take the responsibility of producing absolutely perfect surfaces, nearly 7 feet in diameter, to stand the crucial chemical test of the purification of cannel gas, it was regarded by many able mechanical engineers as very problematical, and doubtful of successful accomplishment, as a thing that had never before been attempted upon such a scale in any department of engineering.

Many members of other departments of the engineering profession, having but little acquaintance with the construction of Gas-Works, have thoughtlessly regarded Gas Engineering as somewhat coarse and heavy, requiring only a moderate amount of mechanical skill. To mechanical engineers the production of perfectly scraped surfaces to stand such a rigid test upon a scale of such magnitude, will not fail to occasion much astonishment, inasmuch as they are, without doubt, the largest scraped surfaces that have ever been made for any purpose in the whole range of engineering, whether in land, marine, or any other department.

For these reasons these large Centre-Valves at the Manchester Corporation Gas-Works rank among the finest examples of engineering work in casting and fitting that have ever been produced, and they are honourable to the profession of Gas Engineering. They conclusively prove that these Patent Dry Centre-Valves, when properly made, can be arranged for any gas apparatus, whatever may be its magnitude, and be absolutely tight to the severest chemical test even for cannel gas.

These Patent Centre-Valves for working purifiers are now being most extensively made for gas-works in all parts of the world, and are taking the place of the old Hydraulic Centre-Valve. Nothing is more durable upon a gas-work. There is nothing to get out of order in the massive surfaced blocks of cast iron. The wear is so very little that a Centre-Valve of this kind will be as good in 30 years as the day on which it is put into work. Their efficiency is tested at once, for unless absolutely tight the test-paper would prove it the very first hour. A man can charge his purifiers instantaneously, which is so important in preventing the passage of foul gas, for the valve slides the quarter turn upon its smooth glassy surfaces with the utmost ease; and a man cannot work them wrong, for the stop-catch arrests the motion at once when the valve arrives at its proper position. The inlet and outlet pipes can be placed in any position in relation to each other, and may enter and leave the Centre-Valve on the same side if required. They are the most perfect of all instruments for working gas apparatus.

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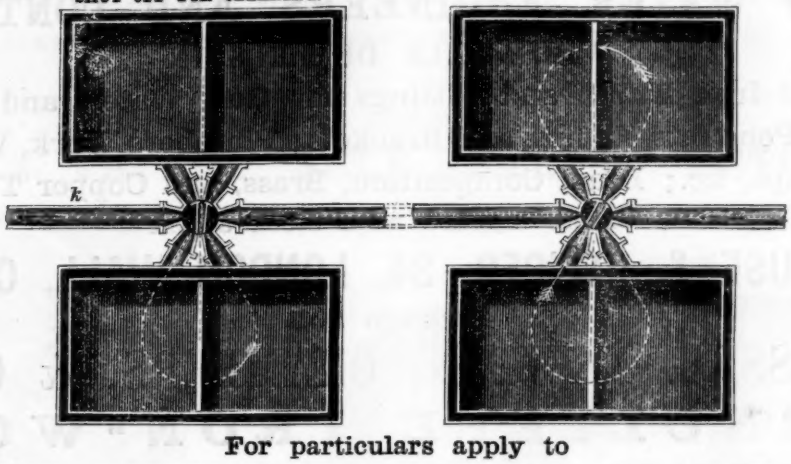
PLAN OF GAS PURIFIERS
WORKED BY
CLAYTON'S PATENT SIX-WAY VALVES.

Only One is required to work Two Purifiers.

SHUT OFF FOR CLEANING.



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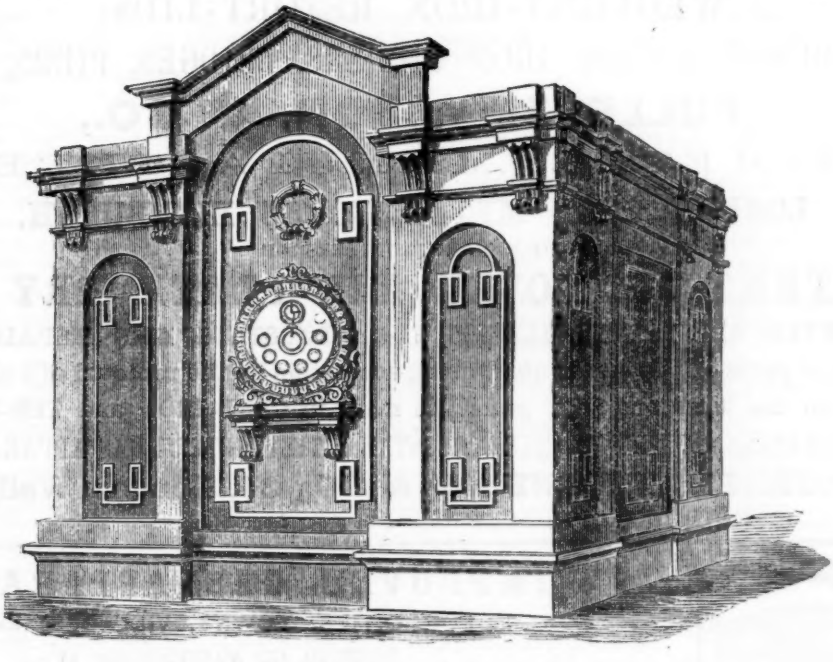
From 8000 to 120,000 Cubic Feet per Hour.



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WITH SPECIAL FACILITIES FOR ADJUSTING AND REPAIR,

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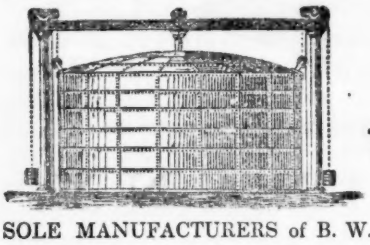
Where Meters are supplied to order from Stock.



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FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

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PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

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SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS.

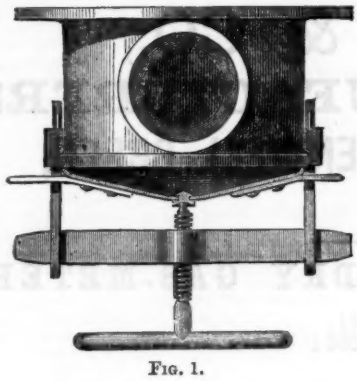

FIG. 1.

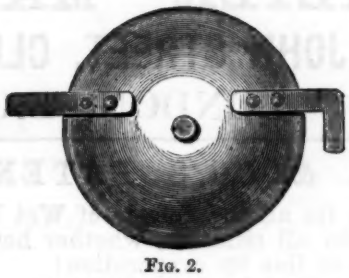

FIG. 2.

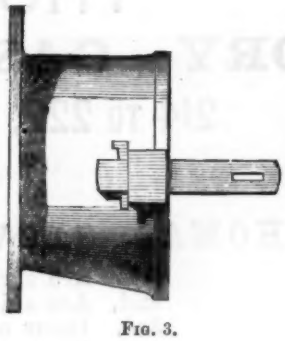

FIG. 3.

Several Hundreds in successful operation in various Gas-Works.

The expensive and cumbersome process of sealing the mouths of Gas-Retorts by means of luting the Lids with lime and other materials hitherto used for that purpose, is henceforth rendered unnecessary, and will be superseded by the very efficient method shown in the accompanying illustrations.

Fig. 1 shows a plan of a mouthpiece with Morton's Patent Lid in section. The mouthpiece is faced true, and the projecting circular edge or periphery of the lid is also turned true, and, by preference, of a semicircular section, so that the point of contact is reduced to a minimum; the convex form of the Lid rigidly sustains the force of the screw, which, by its central action, gives the Lid a uniform bearing, and effectually seals the mouth of the Retort.

Fig. 2 shows a front view of Morton's Patent Lid, which is stamped out of plate iron, having (in this case) ledges to rest on the lugs of the mouthpiece; these Lids, however, are more generally fitted to hinged cross-bars, by which means they remain suspended while the charge is withdrawn and the Retort charged, so that the damage done by throwing them about is entirely prevented.

The advantages obtained are—

1st. The sound sealing of the Retort during the whole time it is carbonizing the charge of coal, there being no jointing medium between the Lid and the mouthpiece.
2nd. The improved condition of the coke by the non-mixture of lime.
3rd. The Lid requires no preparation on the part of the stoker, beyond slightly scraping the surface to remove extraneous grit or dirt.
4th. The Lids are only about two-thirds the weight of the old form in general use, a Lid for a 16-inch mouthpiece weighing a little over 20 lbs.
5th. The Self-sealing Lid reduces labour, saves wear and tear, obviates all the inconvenience and discomfort consequent on the preparation of luting, and effects a great reduction in the working expenses. The cost attending the process of "luting" in several large gas-works, exceeds £1000 per annum, ranging in various works from 20s. to 35s. per mouthpiece.

It will be obvious that a round Lid is the most convenient and the cheapest form. D Retorts are adapted for round Lids, by carrying the bottoms down the necessary depth for that purpose, as shown in Fig 3. Some mouthpieces have been thus adapted, and are in use at the Chartered Gas-Works.

The following testimony speaks in favourable terms after ample and careful test:—

Burslem and Tunstall Gas Company, Longport, Staffordshire, Oct. 12, 1869.

Dear Sir,—In reply to your favour of the 9th inst., I have pleasure in stating that my admiration for your Patent Retort-Lid is most unqualified. I have 14 of them in use, and have tested them in the severest manner possible at these works, but without being able to detect the slightest defect. Yesterday the strap slipped off the exhauster, and a pressure of 13 inches was thus almost instantly thrown upon the Retorts, but although many of the luted Lids were leaking, not the slightest escape was observable from yours. I had anticipated that at least some greater degree of care would have been required in the scraping of the mouthpieces after the drawing of each charge, but even in this particular I find that labour has been reduced.

By every stoker on these works, as well as by myself, your Lids are regarded as a boon.

Please send me 30 more at your earliest convenience.

I am, &c., (Signed) HENRY WOODALL.

R. Morton, Esq.

Chartered Gas Company, Horseferry Road, Westminster, Sept. 15, 1869.

Dear Sir,—I have only lately returned to town, which is the reason I have not replied earlier to your inquiry.

I beg to say that I have had your Lids in use for upwards of two months, and during that time they have always kept a perfectly sound joint. I may add that where your lids are used only one set is required.

I remain, &c., (Signed) G. O. TREWBY.

R. Morton, Esq.

Chartered Gas Company, 146, Goswell Street, E.C., Oct. 20, 1869.

Dear Sir,—I have much pleasure in stating that, after some months trial of your Retort-Lids, I find them everything I could desire. I consider the plan a great improvement.

I am, dear sir, yours truly, (Signed) A. UPWARD.

R. Morton, Esq., London Gas Company.

These Lids are in successful use at the London Gas-Works, the Chartered Gas-Works, the Dublin Gas-Works, the Burslem and other Works, giving great satisfaction.

Application for Licences and other Information to be made to

TANGYE BROS. & HOLMAN, 10, Laurence Pountney Lane, London, E.C.

Sole Makers of Upward's Patent Safety Drilling Apparatus, Weston's Patent Differential Pulley Blocks, the "Special Steam-Pump," the Patent Duplex Lever Punch, &c.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c., &c.,

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

PATENT IMPROVED WET METER.

W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sales of Gas Act.

"It is well known that in Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow, the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the valve instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

PATENT IMPROVED DRY METER,

Which W. P. and Co. pledge themselves to manufacture with the same quality of materials and workmanship as in their Wet Meter, thereby giving Gas Companies and others the advantage of procuring a first-rate Dry as well as a Wet Meter, which, hitherto, they have been unable to do.

STATION-METERS AND GOVERNORS,

Which can be seen at all the London Gas-Works; also at Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

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NOTICES.

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ERRATUM.

At page 157, in the last line but one of the "Circular to Gas Companies," for "*five retort-houses*" read "*four retort-houses.*"

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 15, 1870.

Notes upon Passing Events.

The sensational school of sanitarians, Drs. Farr and Frankland, have been so stung by the strictures of Dr. Letheby on the figments which they supply to the Registrar-General's report, that they have actually persuaded that very respectable and aged official to call the Commissioners of Sewers to account for the hostile report of their medical officer. We all know that the Registrar-General is merely the amanuensis of the sensational school of sanitarians; what they dictate he writes. Drs. Farr and Frankland are the disciples of a sect which deals with facts, not in a philosophic, but in a legal spirit. Having adopted a sanitary theory, they look round for facts and figures to prop it up and make the public stare. So far they are very successful. But they have met more than their match in Dr. Letheby, the medical officer of the City of London—the man who, by the system carried out in conjunction with the engineer, has made the sanitary arrangements of the City of London, as regards the management and regulation of common lodging-houses and poor dwellings, a model for the imitation of every great town in Europe. The Registrar-General wrote on the 16th of February complaining of passages in a report of Dr. Letheby to the Commissioners of Sewers, reflecting on the manner in which the business of his department had been conducted. The passages to which Major Graham took exception were those contending "that death-rate alone, without reference to birth-rate, can afford "no reliable indication of the salubrity of a place." We gave full quotations from this part of Dr. Letheby's report in our "Notes" of the 15th ult.; the last and most stinging sentence quoted being that "*it would be far more satisfactory if the "statistics submitted to the public were more reliable, and less ob-"scured by sensational remarks.*" The Registrar-General concludes, in the high official style, by saying that "as these "remarks betray ignorance of the subject, and convey un-"founded imputations on the department, I shall be obliged by "your informing me whether they are published with the "sanction and approval of the City Commissioners of Sewers." The Commissioners of Sewers have the good sense to say ditto Amen to their very able officer of health, and then let him speak for himself. So Dr. Letheby replies: "If it is a fallacy "to estimate the health of a place by the rate of mortality, "without comparing it with the birth-rate, the Regis-"trar-General is quite at liberty to prove it; for, in com-"mon with all public writers, I myself, as well as the Re-"gistrar-General, must submit to public criticism." It is unnecessary to reproduce the quotation from the essay of Mr. Watt, showing how essential it is to take into account the birth-rate in noting the death-rate. It is quite possible the Registrar-General and his doctors understand the question; but if they do, why do they publish such half truths as are contained in their weekly tabular statement of the death-rate of nineteen large towns of England, without any reference to the birth-rate? "Hence," says Dr. Letheby, "it would be more satisfactory if the statistics were "more reliable." As to the charge of disfiguring statistical reports by sensational statements, Dr. Letheby observes that "month after month, in reporting on the water supplied to the "metropolis, the analytical facts are described in the most ex-"aggerated language." "All the harmless saline substances "which are naturally contained in London waters are character-"ized as '*extraneous matter*,' or as '*stuff of various kinds;*'" the proportions being expressed in tons instead of grains, as is the common way of estimating them by present scientific men. The Royal Commissioners on Water Supply state that "they do "not regard the presence of 10 or 20 grains of mineral matter in "a gallon of water as *impurities*, and that the term is not appro-"priate." Dr. Frankland, it may be remembered, is so anxious to lower the character of the metropolitan water supply, that he has invented a term which, to the scientific, only implies that at some period the water analyzed has passed over the *fossilized excrement* of the *Mastodon* or the *Megatherium*, which lived a few thousand years ago. The whole correspondence has been printed for the Commissioners of Sewers; its perusal may instruct the blind followers of the sensational school of sanitarians. Drs. Farr and Frankland will probably think that they had better have let the report of the medical officer of health for the City of London alone.

At length, after a negotiation which has extended over years, the Dean and Chapter of St. Paul's have consented, in consideration of £20,000, to yield up a portion of the churchyard to the improvement of the public thoroughfares. Out of this £20,000, £3000 will be required for executing the work imposed by the alteration. The Commissioners of Sewers are well satisfied with the bargain, and admit that the land ceded is worth much more, for commercial purposes, than the price they are to pay. Perhaps, considering the intractable character of ecclesiastical authorities in general, where money is concerned, the commissioners are wise to smile and accept in a genial spirit what seems to the outside public a very hard bargain. It is, of course, quite natural that a surveyor should estimate what so many square yards of land in the City are worth for building purposes; but as under no circumstances could the Chapter have used this land for any profit-making purpose, and as the improvement will really add to the effect of St. Paul's Cathedral, it is difficult to avoid feeling that the public have been rather hardly dealt with. It is true that the Dean and Chapter can find a number of evil precedents in the transactions of public bodies and private individuals. The Woods and Forests, who never do anything for the improvement of foreshores, never fail to tax severely those who increase the value of those shores by constructing docks or piers. The Duke of Buccleuch and Sir Robert Peel have had their mansions increased in value to an incalculable extent by the substitution of a fine embankment for a fœtid mud shore, and by large additions to their gardens, but they have succeeded in fining the ratepayers smartly for making so great a public and private improvement. The system—we cannot call it a law—of compensation in the cases of public works is generally a robbery for the benefit of house and land owners. There is not the slightest question that the landowners of England recovered all the losses they sustained after the great war by the return to cash payments, and found means to expend millions in drainage, farm-buildings, and other agricultural improvements, in the compensation they extorted from railway companies during the last forty years, and especially during the period when railway competition was at fever heat.

The Government telegraph system does not work at all. We note that Mr. Crawford is about to call the attention of the House of Commons to the subject. People who send a telegram are also obliged to post a letter, which often arrives first. The difficulty arises from the avidity with which the heads of departments exercised their patronage. They have distributed raw hands all over the country, and been too much in a hurry to suppress duplicate wires. The commercial public must insist that a responsible officer be established in every district, to whom the public may apply when a telegram is miss-sent or delayed. To refer the sender, in such a case, to the London office, is to add insult to injury.

The unprofitable condition of the New Forest was the subject of debate in the House of Commons last week, and is to be the subject of a serious inquiry—it is to be hoped by some more competent persons than the officers of the Woods and Forests. The New Forest as a timber-producing estate is wholly unprofitable. It includes a little good land, a large quantity of very poor land, and no inconsiderable quantity of utterly barren, though often picturesque land. But if the whole estate were laid out for sale, as it would be if it belonged to a private individual, in lots of various sizes—from the extent fit to surround a mansion, down to acre and half acre lots—it would fetch a good price, with the timber and brushwood on the ground. The Woods and Forests idea would be to shave off and sell every vestige of timber, lay the land out in parallelogram farms, sink as much money as possible in drains, roads, and farm-buildings; and then, as they did in Hainault Forest, sell the fee simple for about the cost of the improvements. By the plan we suggest, a resident gentry, able and willing to employ labour, and to develop the utmost fertility of the soil worth cultivating, would be created; while the wages thus paid would enable frugal labourers to purchase or to rent the smaller plots of land which, by nearness to roads and a market, were fit for garden culture. The spade labourer, with an opportunity to earn wages close at hand, can often reclaim waste land where it would not pay a capitalist, if only he has access to a market, and the means of cheaply gathering manure of some kind. The New Forest discussion has brought out Mr. Frank Fuller, with his worthless facts as an advertisement of himself. Mr. Fuller cannot forget the halcyon days when he was a "Co." with Messrs. Cole and Dilke, the promoters of the First Great Exhibition. Mr. Fuller relates that three acres and a half of New Forest land, divided and let off by the rod at the rate of £2 per acre, have been successfully cultivated by labourers with the spade. True, no doubt; but the miniature example proves nothing useful for dealing with thousands of acres of land. Take, instead of three acres, three thousand of New Forest land, colonize it with spade husbandmen, all wanting a market, all gathering highway manure, and you ensure the ruin of nine out of ten. In the old coaching times there were squatters who successfully reclaimed plots of the barren Bagshot Heath, perhaps the barrenest land in the kingdom, considering the favourable climate; but then they perched close to the high road, and industriously gathered the dung of the hundreds of coach and post horses that passed daily. We advocate the cutting out of plots of wild land wherever the shape suits for the cultivation of spade labourers, for the moral more than the financial results; the produce of the garden, the cow, the poultry, and the bees, will find customers if mansions, villas, and cottages of gentility dot the picturesque but generally barren Hampshire Forest. The *Pall Mall Gazette* has a scheme for making the New Forest a camp and review-ground more useful than the plain of Châlons. There would be room for that, too, and yet fringe every road with large and small fancy farms and cottage gardens. New Park, the one model farm of the New Forest, has cost the Woods and Forests, under an improvident lease, a fortune. The tenant, Mr. Dickenson, once a great jobmaster in Mayfair, always avows that he farms for pleasure, not for profit.

The Board of Trade has taken up the subject of tramways, and brought in a general measure, which will enable local bodies either to construct tramways, or to grant the power on terms to private capitalists without obtaining a separate Act of Parliament. The following is an extract of the Bill:—

Certificates authorizing the construction of tramways may be obtained by the local bodies themselves, with the consent of the ratepayers, or by any other persons, with the consent of the local authority. Where the promoters are their local authority, or others by their consent are so, they may, within a period of two years from the date of the certificate, and with the consent of the Board of Trade, sell the powers and privileges granted by such certificate. But the tramways are to be made within two years, unless the Board of Trade sanction a longer period. Should the local authority lay the tramway, they are to have power to lease for 21 years the right of user to any person or body of persons, or leave the tramway to be used by the public, and may demand tolls and charges; but the local authority is prohibited themselves from the use of the tramway for public traffic. The promoters, in order to obtain a certificate from the Board of Trade, must deposit their plans and sections, with an estimate of the expense of the proposed tramway, and publish notice of the intended application. The draft certificate is to be laid before Parliament, and unless the promoters are the local authority they are required to deposit a certain per centage of the cost of constructing the tramway. The Lands Clauses Acts are incorporated in the bill, excepting the powers for compulsory purchase. Whilst the certificate of the Board of Trade is to be as valid as an Act of Parliament, the board may revoke or alter it. Where local authorities make the tramway, power is given to borrow money on mortgage of the rates for the purpose, for any time not exceeding 30 years. Separate accounts are to be kept, and the balance, if any, after the completion of works to be paid in relief of rates. It is distinctly specified that the uppermost surface of the tramway rail shall be level with the surface of the road, and the tramway not to be opened till certified as fit for traffic. This Act is to apply equally to tramways already sanctioned. Promoters may break up streets upon giving certain notices, under superintendence of road authority, but in no instance for a greater length than 100 yards at one time unless by special consent of such authority, and to be liable to penalties in case of default. Promoters are to be compelled to pave and keep in repair the portion of the roadway between the tramways and 18 inches on either side, and where two tramways are laid at not more than 4 feet from each other they are to pave and maintain the intervening space. In default the road authority may do the work, and charge for the same. The position of gas and water pipes, telegraph wires, &c., may be altered, if necessary. Works calculated to interfere with sewers are to be done under directions of the authority at expense of promoters. The tolls are to be fixed by the Act, with power to the Board of Trade to vary them.

Mr. William Hope, V.C., pending the commencement of his great work on Maplin Sands, has been reading an amusing paper at the Society of Arts on "The Use and Abuse of Sewage." He compared the attempts to extract a commercial manure from liquid sewage, not to extracting a grain of wheat from a sack of chaff, but "a cell of yeast from a trough of dough." As to Moule's system of dry earth, he thinks it may do where there is a system of rigid discipline, as in barracks or a workhouse, but for a village he considers it impracticable. There we differ from him. We can see no reason why a professional scavenger should not be appointed for every village, whose business it should be to see that every open privy was periodically supplied with dry earth, and that the contents should be removed to the neighbouring gardens, allotments, or muck-heaps on agricultural land. To introduce water-closets into villages or even small agricultural towns is to create a liquid nuisance, and to waste manure which can easily and profitably be applied to garden produce. As to the application of the earth system to large towns already provided with sewers, it is an idea that could only be broached by a medical fanatic like Dr. Hawksley, or a patentee like Mr. Moule. Be it observed, in passing, that dry earth may be applied with a hand shovel, without any patent at all, to any open privy; as also may be the dust and ashes of a country house. But it is ridiculous to imagine that any rational people would submit to the "nuisance "of long strings of carts bringing fresh earth into our towns, and "longer strings of carts carrying away the used earth and sewage, "accompanied by their own particular harpies, disturbing our "families at unseemly hours, making night hideous with uncouth "sounds and imperious demands for beer." The system would also break down because the bedroom slops would have to be divided between "two slop-pails, one with a bright crimson E for "earth, and the other with a black S for sewer, to the utter con-"fusion of the British housemaid," not given to dividing our

liquids. Mr. Hope, in his practical suggestions, lays it down that where a population is increasing, the land for sewage irrigation should be provided at the rate of one acre for every twenty persons, but that where it is stationary, one for every forty persons would be sufficient. For conveying sewage from town to country, he prefers concrete to brickwork or earthenware pipes. For distribution he recommends sheet-iron troughs of a pattern which he exhibited, at a cost of 7s. 2d. per yard forward. Distribution, he maintains, can be effected where the levels will not admit of earth ditches, at a cost of from £5 to £10 an acre.

The third division, or the application of the sewage to the soil and crops, is a very simple process. The farm to be laid out having been carefully surveyed, the levels accurately taken, and the general scheme of the distribution settled upon by the surveyor, the lines of the main distributing channels should be marked on the map, being taken as much at right angles to each other as possible. Then the intervening spaces should be divided into "beds" or "lands" about 30 feet wide, and from 100 to 300 or 400 yards in length, according to the fall of the land, and handed over to the farmer. Then he should obliterate the marks of the old cultivation by a little shallow ploughing and cross-harrowing, when one deep ploughing will often suffice to throw up the land into ridges, as marked on the map by the surveyor. The irrigating channels are then taken out by plough or hand along the ridges.

In the discussion that followed, Dr. Voelcker stated that in his opinion the sewage of not less that one hundred persons should be applied to each acre irrigated. He also suggested that the experiment should be tried of irrigating fallow land to the extent of ten thousand tons per acre, and then growing on soil so manured a rotation of crops. He thought this would be likely to turn to a cheap and successful mode of increasing fertility.

A successor to the absurd plans of Mr. Brandon for railway management has been found in a Mr. G. W. Jones, who read a paper at the Society of Arts, amidst great applause, in which he proved to his own satisfaction that it was possible and profitable to run trains what he called stages—fifteen or twenty miles—charging for third class one penny, and for first class sixpence. Mr. Jones has not used Mr. Brandon well, in thus pirating and disfiguring his scheme; for it is just as reasonable to propose that railway passengers should be carried from Land's End to John O'Groats for one shilling, as that trains shall run in all directions at a charge of one penny per twenty miles. Empirics of this kind do not trouble themselves with arguments; they declaim, like a mountebank doctor from a cart, and the zanies cry "Hear," when he declares that his pill will cure every known malady, from small-pox to a broken leg. If we are to believe Mr. Jones, Mr. Brandon, and Mr. Edwin Chadwick, C.B. (the chairman of the meeting), the managers of such great lines as the Midland, the Great Western, the London and North-Western, and Great Northern, are so ignorant, so stupid, so prejudiced, that neither the competition in which at times they have been keenly engaged, nor the desire to create a dividend which would make the fortune of every one concerned in the Great Western, nor the desire to double and treble the respectable dividends on the other lines, will induce them to adopt a system of low fares which would centriple their gross receipts. One of the most experienced of railway managers, Mr. Allport, states most positively that a railway train cannot be run under 2s. 4d. per mile; but the answer of the Brandons and the Jones's is that he knows nothing about his business, and that they are quite sure that it can be run for fourpence, sixpence, or sevenpence, or any sum that suits their calculation of profits. Any comparison between the increase of postage and of railway traffic is impossible. With a penny postage a man may be tempted to write a dozen letters in one day, or to send out thousands of circulars, but a man can only take one journey at once, and can only spare a certain proportion of time for travelling. Fares reduced below a certain sum would fill trains that did not pay, or barely paid, when filled at holiday times, leaving trains to run empty on ordinary occasions. If it be settled that it is the business of Government to carry railway passengers without profit, or even at a loss, that is a different thing. But then the same argument would prevail in favour of clothing the labouring classes on wholesale principles from Government stores; and, then, why not Government bakers and butchers? As for the threat of Government management, it will be time enough to discuss that when our Government has managed to build an iron ship as cheaply as Mr. Laird or Mr. Samuda, or to manage the telegraphs with decent regularity. Mr. Allport's remarks alone are worth extracting:

Mr. James Allport (Midland Railway) would say a word or two on the question of workmen's trains in the metropolis. It was quite true the Metropolitan Company last year carried 750,000 workmen, the fare being 1d. per journey, and the distance traversed was 4200 miles. The total receipt would be therefore £3000 per annum, and he was quite certain that any man practically acquainted with railway matters would say that no trains could be run for anything like the amount per mile which that sum would give when divided; and consequently, the Metropolitan Railway, although they carried 750,000 passengers, must have lost by them considerably. The Great Western also had been lately experimenting upon workmen's trains, and, as Sir Daniel Gooch had informed him very recently, the result was that the average number of passengers using these trains was 40 per day, which could not pay anything like the working expenses. He (Mr. Allport) was the oldest railway manager in the United Kingdom, and perhaps few had tried more experiments with regard to passenger traffic, and he stated most unhesitatingly that whether railways were in the hands of the Government or of private individuals, it would be impossible for the company to work, or for the lines to accommodate the trains numerous enough to give anything like a sufficient return on the capital expended in this country for railways, which amounted to about 500 millions. Even if they could carry the number, the working expenses would be very great. They must have a certain weight in the engines and carriages, and the rails were constantly wearing out. Mr. Jones had stated, quoting apparently from the evidence of Sir Daniel Gooch, that every additional engine on the Great Western line costs 4d. per mile, but he had no hesitation in saying that the permanent way expenses alone amounted to more than 4d. per train mile run on that line—at any rate, they did on the Midland, which was one of the largest in the kingdom. Taking the average throughout the country, the expense per train per mile was not less than 2s. 4d., and, however you multiplied the number of miles, the result would remain pretty much the same.

Circular to Gas Companies.

As we anticipated would be the case, the terms offered by the amalgamated Chartered and City Gas Companies to the Great Central Company are sufficiently liberal to justify the rise which has taken place in the value of the latter company's shares since the negotiations commenced, and will even justify a further advance. £17 per share is only 17 years purchase on a guaranteed dividend of 10 per cent. in perpetuity, whereas the ordinary shares of many provincial companies sell for 20 years purchase, and some for even more. The report of the general meeting of the Great Central Company will be found in another place, and from the speech of the chairman it will be seen that the proposed amalgamation is to be effected immediately, the shareholders of the Great Central Company being guaranteed a dividend of 7½ per cent. for 1869, and 10 per cent. for the future. The statement of Mr. Alderman Dakin left no doubt of the advantage of the amalgamation to the shareholders of the Great Central Company, and if any parties object, it will probably be the proprietors of the Chartered and City Companies, who, according to the calculations given for 1869, are left with only £40,000 to pay interest on £1,260,000 of ordinary capital. The future operations of the amalgamated companies will no doubt improve this state of affairs, and the saving of £50,000 a year, which it is anticipated will be realized when the Beckton works are in full operation, will place the ordinary shareholders of the Chartered and City Companies in a very fair position. As regards the officers of the Great Central Company, the arrangements proposed seem to be perfectly satisfactory. Mr. Massey, the secretary, retires with £500 a year, with which he expressed himself to be quite content. The services of Mr. Harris, the engineer, and Mr. Pontifex, the chief inspector, are, at all events for the present, retained for the amalgamated companies. What remuneration the directors of the Great Central Company are to receive was not mentioned; but the chairman said they intended to take care of themselves. The motion sanctioning the amalgamation was carried unanimously. This arrangement is the first step towards carrying out the recommendation of the report of Mr. Cardwell's committee by amalgamating the whole of the City companies; and it remains to be seen whether the Commercial, the Ratcliff, and the West Ham Companies may not be disposed to accept similar terms, and thus place the whole of the supply of gas to the East-end of the metropolis under one management. Future negotiations may possibly result in further fusions, by which the supply of the metropolis north of the Thames may be divided between two companies, and the three companies south of the river be amalgamated into one company.

We reprint *in extenso* the scheme of amalgamation of the Chartered and City Companies, as finally agreed to by the Board of Trade. It accepts, of course, the *status in quo* of both companies, and unites them under the name of "The Gaslight and "Coke Company." The capital of the united company will be £1,950,000, the aggregate authorized capitals of the two, but it will be divided into 195,000 shares of £10 each, of which 185,000 will be designated A shares, and the remaining 10,000 B shares. These will be allotted to the shareholders of the uniting companies in the following way:—The shareholders in the Chartered will, in respect of every fully paid-up share in that company, be registered as the proprietors of five fully paid-up A shares in the united company, and for every share on which £45 has been paid will receive four fully paid A shares, and one with £5 paid thereon. Every holder of fully paid-up A shares in the City Company will in respect of each be entitled to two fully paid A shares in the united company, and for every B share to one B share in the united company. Each fully paid "new share" in the City Company will be exchanged for one fully paid A share in the united, and the holders of "new shares" not fully paid will be registered as the proprietors of an equal number of A shares, with £5 paid thereon. This arrangement greatly simplifies the capital account of the united company. For the rest, we need only call attention to the arrangement by which the remuneration of the directors of the amalgamated companies are

gradually reduced, until, after nine years, they are settled at a maximum amount of £3000 per annum; and, finally, to the provision made for retiring officers. These for the present are officers of the united companies, but the services of some will necessarily be dispensed with, and the arrangements made for their retiring allowances are as follows:—Every officer who has been employed by either company for ten years or more is entitled to an annuity for life, which, if he has been in the service of the company for twenty-five years or more, will amount to two-thirds of his present annual emolument. For any shorter period of service the annuity will diminish by one twenty-fifth for every year less than twenty-five. It is, however, subsequently and very properly provided that an officer who has rendered special services to either company may, with the sanction of the Board of Trade, receive a larger amount than is authorized as above. Officers who have been employed for less than ten years may be paid a gratuity, which is not to exceed one year's emolument, but any larger compensation must receive the sanction of the Board of Trade. Weekly servants who are dispensed with may receive a gratuity of three months pay. It is proper to add that the annuities above mentioned may be compounded for by the payment of a lump sum, calculated according to the annuity tables published by the Postmaster-General. These arrangements, coinciding as they do with those commonly adopted under similar circumstances, leave no room for comment. It only remains to be said that the scheme gives the Board of Trade power to stop the manufacture of gas at the Blackfriars works after the expiration of two years from the completion of the works at Beckton, and the storeage of gas at the same station after the expiration of five years.

The gas Bills which have come on for consideration before the parliamentary committees have not as yet been of much importance. The rival Lynn Bills have resulted in a compromise, by which the "Consumers Bill" is withdrawn, and Mr. Malam's Bill is allowed to proceed on his agreeing to give the subscribers to the Consumers Company the option of taking half the shares in his company, and paying the costs of the Consumers Company—a penalty which Mr. Malam is not unreasonably called upon to pay, considering that he took no steps to regulate his monopoly in the supply of gas to the town until a new company was projected.

In another place will be found the offical report of Professor Chandler on the methods of purification adopted by the New York gas companies. The managers of these very sensibly prefer the dry lime process of purification, but with one exception they have obstinately refused to carry it out so that it should not be a nuisance to the neighbourhood around the works. The exception is the Manhattan Company, who have adopted a "ven-" tilating process," by which the foul gases from the lime are destroyed. The New York Company have at last taken to the iron mode; but the Metropolitan Company still stand out against the Board of Health, and we do not gather that any power exists by which they can be compelled to change their system. Professor Chandler, it will be seen, takes the opportunity of giving a general review of the modes of purification in use, in the course of which he tells us nothing new, while in the special remarks on the methods adopted in London he shows a want of correct information. He seems to suppose that oxide of iron alone is used to purify London gas, the fact being that it is almost invariably used in conjunction with lime, and that in some instances lime alone is employed. The Professor ought further to know that when oxide of iron and lime are used together, the amount of sulphur left in the gas is always in an inverse proportion to the quantity of lime employed. The remarks on the innocuousness of sulphur in gas must not be allowed to mislead gas managers. No sensible person ever alleged that the products of its combustion vitiated the atmosphere of a room to a dangerous extent, but the mischief done to dry goods, hardware, and plate is unquestioned, and it should be the object of every manager to remove as much sulphur as possible. As regards the relative cost of the iron and lime processes, the Professor is equally in want of information, since he only takes into account the cost of the materials, and says nothing of the labour involved in the two processes.

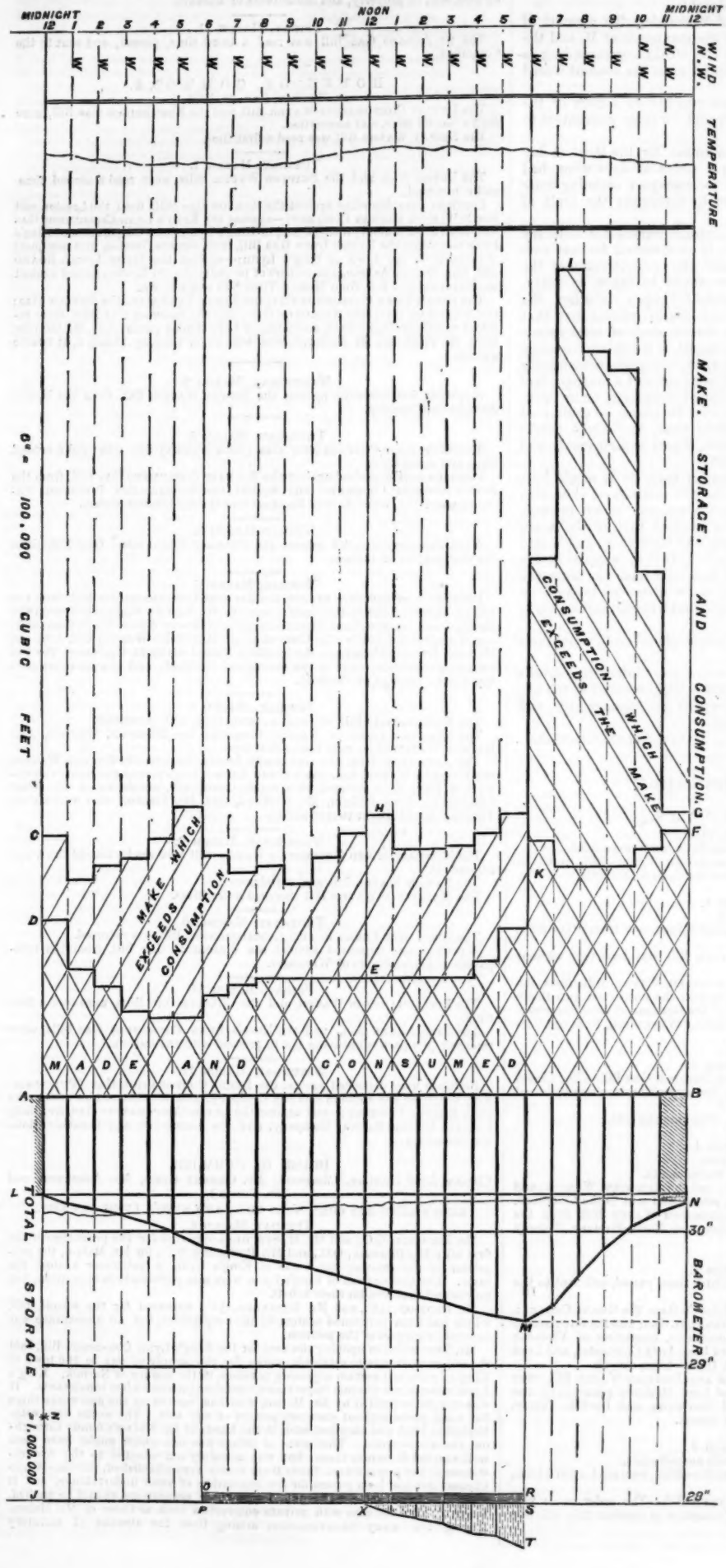
We may commend to the notice of gas managers the simple system devised by Mr. D. A. Graham for registering in a graphic form the daily make, consumption, and stock of gas. It will be seen that by drawing a few lines on the diagram, a, for practical purposes, sufficiently correct representation of the working is given, which will serve as a guide to a manager under any peculiar circumstances.

The Roumanian Gas Company have failed in their appeal to the London public for funds to carry out the concession for lighting Bucharest with gas, and have returned the deposits paid by the applicants for shares. The failure, we believe, is attributed by the promoters to a combination of Hebrew capitalists, who are determined that no British capital shall be embarked in any Roumanian speculations while the alleged wrongs of their co-religionists in that country remain unredressed; but it is far more likely that the mistrust created by the City of Moscow gas swindle has been its chief cause. Another company previously formed for carrying out the Bucharest concession, under the title of the Danubian Gas Company, Limited, is now in liquidation.

The Tramways Bill just brought in by the Government deserves the serious attention of gas and water companies. In the first place, it empowers all local authorities in England to give, with the consent of the ratepayers, certificates authorizing the construction of tramways within their district, without any application to Parliament. In the next place, it empowers the promoters of the tramway, where and as far as is necessary for their purpose, to alter the position of any mains or pipes for the supply of gas or water, subject to the following restrictions:—1. Seven days notice is to be given to the company of the intention to lay down a tramway, and at the same time a plan and section of the proposed work is to be delivered. Then if it appear to the company that the construction as proposed would endanger or interfere with the supply of gas or water, the company may give the promoters notice to lower or alter the position of the mains and pipes as may be considered necessary, and this is to be done at the expense of the promoters, the company superintending the work. 2. The promoters are not to remove or displace any mains or pipes (other than private service-pipes), or do anything to impede the passage of gas and water, without consent of the company, and until good and sufficient substitutes in lieu thereof are laid down and ready for use to the satisfaction of the engineer or surveyor of the company. It is provided that any disagreement on these matters between a company and the promoters is to be referred to an engineer appointed by the Board of Trade. 3. The promoters are not to lay down any pipes contrary to the regulations of any Act of Parliamant relating to the company concerned. 4. The promoters are to make good all damage done to the property of a gas or water company, and make full compensation to all parties for any loss or damage sustained by reason of any interference with the mains, pipes, or works of a water or gas company, or with the private service-pipes of any person supplied by them *with water;* from which it would appear that the promoters of a tramway will be allowed to cut off a consumer's supply of gas with impunity. 5. It is provided that if in any operation the promoters interrupt the supply of gas or water through any main, they shall be liable to a fine of £20 for every day during which the interruption lasts. The bare possibility of the occurrence of such an interruption, which may leave a large district in darkness or without water, will be sufficient, we should think, to excite a lively opposition to the measure. If, however, such an interruption as is here contemplated be only a remote and barely possible contingency, the occasional interruption of the traffic on a tramway may be considered as certain; for clause 22 of the Bill provides that nothing in it shall take away or abridge any power a company may have to break up any road along or across which a tramway is laid, for the purpose of laying down, repairing, or altering mains or pipes. But this is to be done (1) so as to cause as little inconvenience as circumstances admit; and (2) except in cases of urgency, when no notice is necessary, eighteen hours notice of the intention to stop the traffic is to be given. Further (3) the company is not liable for any injury done to the tramway, or for any loss of traffic occasioned by the interruption. Lastly, it is provided that work which immediately affects a tramway is to be executed under the superintendence and to the satisfaction of the promoters; and any additional expense imposed on a gas or water company by reason of the existence of a tramway in any road where pipes, mains, &c., have been laid before the construction of such tramway, shall be borne by the promoters. How far these latter provisions will be considered satisfactory to gas and water companies remains to be seen. The general public will hardly regard with equanimity the possibility of being deprived for a time of their gas or water supply, or, on the other hand, the inevitable occasional interruptions to their usual mode of conveyance.

The suffocation of a whole family on board a sloop, by the vapour from ammoniacal liquor, offers a sad illustration of the ignorance and carelessness often found among those who deal with dangerous substances. There was a small close cabin in close proximity to leaky tanks intended to hold the liquor, which ran through to the floor of the vessel, and exposed a surface of 300 superficial feet to give off vapour; and the floor of the cabin not being tight, the vapour, undisturbed by currents of air, naturally accumulated, with the melancholy result detailed. The curious thing is that nobody concerned seems to have known that the vapour was poisonous, not even the manager of the alum works using the liquor. Now that the fact of its being so is clearly proved, it is to be hoped that due care will be taken to prevent a repetition of such an accident.

SUGGESTED DIAGRAM FOR REGISTERING THE DAILY MAKE, CONSUMPTION, AND STOCK OF GAS.



SIR,—There are perhaps few occupations which demand more unremitting care and attention, than devolves upon those who are connected with the balancing of gas stocks. And it will be unnecessary to remind those of your readers who are managers, or are otherwise connected with the manufacture of gas, that there are occasional unavoidable causes of anxiety little dreamt of by the majority of those who enjoy the benefits of the best of artificial lights.

With a view to render a complicated problem more intelligible, I would lay another system of registering gas stocks before your readers, believing it would be found of occasional advantage if practised in connexion with the method at present in use.

By this system, the make, consumption, and storeage, would be registered in the form of a diagram, drawn on any convenient part of the carbonizing page, or in a separate book kept for the purpose, which if accurately delineated might frequently be found of material assistance to the judgment.

The figure might be constructed as follows:—

Draw a line, A B, of any convenient length, and divide it into 24 equal parts (hours). At right angles to this line, lay off ordinates with a diagonal scale, or from the line of lines on a sector which shall represent the make, consumption, and storeage for each hour. Join the points, then considering each space or hour, of the same unit of length, and not a multiple of the unit of the scale, which it is, then the areas may be taken to represent the day's make, consumption, and the excess of that day's stock over the amount consumed on the preceding day. Thus—

A C H F B would represent the day's make.

A D E K I G B, the day's consumption.

D C H K E, the day's storeage. To which must be added—

A L, the amount in the gasholder, at midnight.

A D E K F B, the amount made, which supplies the public but is not stored.

K I G F, the consumption which exceeds the make.

If each day's make were made equal to each day's consumption, and the diagram corrected for a variable atmospheric pressure, temperature, and gasholder pressure, to the standards for each; then the day's make, A C H F B, would equal the day's consumption, A D E K I G B, and taking away the common area, A D E K F B (made and consumed), there would remain the day's storeage, D C H K E = area of K I G F, the excess of the day's consumption over the day's make. This would only be "approximately" true where the public were supplied through the outlet of the gasholder; but would be more nearly correct in works where the public mains branched from the inlet of the holder.

The line D E K I G would vary with the season of the year, the latitude, and would also be affected by weather, temperature, atmospheric pressure, moonlight, and other circumstances.

The line C H F would vary with the make, letting out or putting up work, settings on slow fires, length of charge, quality of coals, &c.

A J represents the gasholder storeage in units of length, in this

case representing 1,000,000 cubic feet; THE UNIT BEING EQUAL TO 1000 CUBIC FEET.

A L, the amount of gas in stock at midnight.

The length of the lines between L and M showing the amount of gas in stock at each hour until it reaches the maximum at M, and the ordinates between M and N representing the stocks corresponding to each hour until midnight, when B N is found to be the amount stored in the gasholders.

THE TOTAL STOCK SCALE IS HERE REPRESENTED as 1-20th of the measure of MADE and consumed, but it would be more convenient to make it 1-10th.

A diagram showing the greatest consumption for the shortest day for a particular latitude, or representing a series of days when bad weather prevailed, would be very useful to managers claiming more gasholder room, and would enable them to determine the limit of safety more easily.

Past experience would determine the average curves for ordinary weather for every day in the year, which, if constructed for any particular latitude, and drawn so as to make the greatest make of the year equal to 1,000,000, or whatever else might be taken as unity, then multiples, or sub-multiples, depending upon whether the amount consumed on the shortest day were less or greater than that number, would give the theoretic makes for all sizes of works similarly conditioned in that latitude; which result, it will be unnecessary to remark, could not always be depended upon, but might occasionally be found useful; as, for instance, if a fog came on, and a manager had cause to be anxious, by using the proportional compasses, or by opening the sector to the greatest consumption for that hour, he could read off a proportional increase for any length of time, and might obtain some idea of how his stock was likely to last, if past experience showed that the fog-line depended upon proportion.

The converse would also be approximately true, as it would be a guide when to let out work, and when to put settings on slow fires most profitably. Thus, if A Z had been the amount of gas in stock at midnight instead of A L, it will be evident that if the work continued the same the holders would begin to blow at X, and would blow away Δ, X S T gas; but the rectangle P O R S, is equal to the area of the Δ, X S T, and if O P less gas had been made per hour, the gasholders would not blow, nor would it be necessary to hold on where gasholder room is very deficient, but would enable managers, in a measure, to anticipate results.

The barometer and thermometer lines are so placed as to show their influence on the consumption.

In conclusion, it will be seen that there are many interesting details which could be treated in this manner, and being presented to the eye in a graphic form, might do a little to simplify gas management, and tend to make it more easy and economical.

DAVID ALLAN GRAHAM.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, FEB. 28, 1870.

The BECCLES WATER, and CARMARTHEN GAS Bills, were committed.

Petitions were deposited against the BIRMINGHAM WATER Bill, from the Corporation of Birmingham and the Right Hon. Sir C. B. Adderley.

TUESDAY, MARCH 1.

The SOUTHPORT WATER Bill was committed.

The LITTLEHAMPTON WATER, and the NEWPORT (ISLE OF WIGHT) GAS Bills, were reported, with amendments.

The RUNCORN, WESTON, AND HALTON WATER Bill was reported, without amendment.

Petitions were deposited against the BIRMINGHAM WATER Bill, from the Birmingham Canal Navigation Company;—against the BRIGHTON AND HOVE GENERAL GAS Bill, from the Commissioners of the Harbour of New Shoreham and G. K. Carr Lloyd;—and against the SOUTHPORT WATER Bill, from the Corporation of Southport.

THURSDAY, MARCH 3.

CHILTERN HILLS SPRING WATER Bill, and CHESTER GAS Bill.—The Chairman of Committees informed the House that the opposition to these Bills had been withdrawn. They were then committed.

The MANSFIELD WATER Bill was reported, with amendments.

FRIDAY, MARCH 4.

The BIRMINGHAM WATER Bill was committed.

The CHESTER GAS Bill was reported, with amendments.

The NEWPORT (ISLE OF WIGHT) GAS Bill, and the RUNCORN, WESTON, and HALTON WATER Bill, were read a third time, passed, and sent to the Commons.

Petitions were deposited against the BIRMINGHAM WATER Bill, from the Midland Railway Company and the London and North-Western Railway Company.

MONDAY, MARCH 7.

The MANSFIELD WATER Bill was read a third time, passed, and sent to the Commons.

The RAINHILL GAS AND WATER; the ST. HELEN'S GAS; the GREAT CENTRAL GAS CONSUMERS; the BRIGHTON AND HOVE GENERAL GAS; and the SOUTHPORT WATER Bills, were referred to a Select Committee, consisting of Viscount Hardinge (chairman), Lord Abercromby, Lord Ross, Lord Colchester, and Lord Castletown, who will sit on Thursday, March 10, at eleven o'clock.

The BRECON GAS Bill, and the SHOREHAM AND DISTRICT WATER Bill, were referred to a Select Committee, consisting of Lord Methuen (chairman), the Marquis of Normanby, Earl Cadogan, Lord Sherborne, and Lord de Tabley, who will sit on Monday, March 14, at eleven o'clock.

TUESDAY, MARCH 8.

The ST. ALBANS GAS Bill was reported, with amendments.

The LITTLEHAMPTON WATER, and CHESTER GAS Bills, were read a third time, passed, and sent to the Commons.

GREAT CENTRAL GAS CONSUMERS COMPANY'S Bill.—The order made yesterday, appointing certain Lords the Select Committee to consider this Bill, was discharged.

The YEADON WATER Bill was reported, with amendments.

A petition was deposited against the RAINHILL GAS AND WATER Bill, from owners, &c., of property, and inhabitants of Rainhill.

FRIDAY, MARCH 11.

The ST. ALBANS GAS Bill was read a third time, passed, and sent to the Commons.

HOUSE OF COMMONS.

MONDAY, FEB. 28, 1870.

The DUBLIN CORPORATION WATER Bill, and the ROTHERHAM GAS Bill, were read a second time, and committed.

The NEWRY WATER Bill was read a first time.

TUESDAY, MARCH 1.

The LEEDS GAS, and the SKIPTON WATER Bills, were read a second time and committed.

Petitions were deposited against the BUXTON GAS Bill, from the London and North-Western Railway Company;—against the KING'S LYNN CONSUMERS GAS Bill, from John Malam; owners, &c., in King's Lynn; and Corporation of King's Lynn;—against the KING'S LYNN GAS Bill, from owners, lessees, and occupiers of property in the town of King's Lynn;—against the HYDE LOCAL BOARD Bill, from Messrs. Ashton, and owners of property, &c, in Newton;—and against the SHIPLEY GAS Bill, from Messrs. Titus Salt and Co., &c.

The KING'S LYNN CONSUMERS GAS; the KING'S LYNN GAS; the BUXTON GAS; the WREXHAM GAS; the AIREDALE GAS; and the SHIPLEY GAS Bills, were referred to a Select Committee, consisting of Lord Henley (chairman), Mr. Ormsby Gore, Mr. Price, and Mr. Assheton, who will sit on Tuesday, March 8, at twelve o'clock.

WEDNESDAY, MARCH 2.

A petition was deposited against the NEWRY WATER Bill, from the Newry Navigation Company.

THURSDAY, MARCH 3.

The SHEFFIELD CORPORATION GAS (NEW WORKS) Bill was read a second time, and committed.

Petitions were deposited against the BELFAST CONSUMERS GAS Bill, from the Belfast Gaslight Company;—and against the ENNISKILLEN BOROUGH IMPROVEMENT Bill, from Horatio Brothers and George Dunbar Malam.

FRIDAY, MARCH 4.

A petition was deposited against the BELFAST CONSUMERS GAS Bill, from the Corporation of Belfast.

MONDAY, MARCH 7.

Petitions were deposited against the BELFAST CONSUMERS GAS Bill, from the Belfast Central Railway Company;—against the NEWRY WATER Bill, from the Newry Town Improvement Commissioners and Newry Water-Works Company;—and against the SHEFFIELD CORPORATION GAS (NEW WORKS) Bill, from the Midland Railway Company; the Sheffield United Gaslight Company; the gas consumers and ratepayers in the borough of Sheffield; and the gas consumers beyond the borough of Sheffield.

TUESDAY, MARCH 8.

The READING GAS Bill was read a second time, and committed.

The NEWPORT (ISLE OF WIGHT) GAS, and the RUNCORN, WESTON, AND HALTON WATER Bills, were read a first time.

The ABERDARE GAS; the ABERDARE LOCAL BOARD; the RUABON WATER; the HALIFAX WATER, &c.; the YEOVIL IMPROVEMENT; and the BATH CORPORATION Bills, were referred to a Select Committee, consisting of Mr. Nicol (chairman), Lord Pelham, Mr. Whitwell, and Mr. Fielden, who will sit on Tuesday, March 15, at twelve o'clock.

WEDNESDAY, MARCH 9.

The NEWCASTLE AND GATESHEAD WATER Bill was read a second time, and committed.

The NEWRY WATER Bill was withdrawn.

The MANSFIELD WATER Bill was read a first time.

THURSDAY, MARCH 10.

The BROUGHTY FERRY POLICE COMMISSIONERS Bill was reported.

A petition was deposited against the WREXHAM GAS Bill, from the ratepayers and inhabitants of Wrexham.

FRIDAY, MARCH 11.

The LITTLEHAMPTON WATER, and the CHESTER GAS Bills, were read a first time.

The KING'S LYNN GAS, and the KING'S LYNN CONSUMERS GAS Bills, were reported (the parties resolving not to proceed with the latter).

SATURDAY, MARCH 12.

Petitions were deposited against the LEEDS CORPORATION GAS (PURCHASE, &c.) Bill, from the Midland Railway Company, and the Lancashire and Yorkshire Railway Company;—and against the LEEDS CORPORATION GAS, &c., Bill, from the Midland Railway Company, and the Lancashire and Yorkshire Railway Company.

HOUSE OF COMMONS.

(*Before Lord* HENLEY, *Chairman; Mr.* ORMSBY GORE, *Mr.* ASSHETON, *and Mr.* PRICE.)

KING'S LYNN GAS CONSUMERS BILL, AND KING'S LYNN GAS BILL.

TUESDAY, MARCH 8.

Mr. RODWELL, Q.C., and Mr. H. STEPHENS appeared for the promoters of the first bill; Mr. DENISON, Q.C., and Mr. RICHARDS, Q.C., for Mr. Malam, the proprietor of the existing gas-works at King's Lynn, a petitioner against the same. The Corporation of King's Lynn were also petitioners in opposition, but no counsel appeared on their behalf.

Mr. DENISON, Q.C., and Mr. RICHARDS, Q.C., appeared for the second bill, which had been petitioned against by the corporation, but no appearance was entered in support of the petition.

Mr. STEPHENS, in opening the case for the King's Lynn Consumers Bill, said the object of it was to establish works for the supply of gas to the town of King's Lynn, and certain adjoining parishes, in the county of Norfolk. King's Lynn was a town of some importance, containing about 18,000 inhabitants. It was at present lighted by Mr. Malam, who had carried on the gas-works there for some years without statutory powers of any sort. The works were established in 1826, and they had been in the hands of Mr. Malam's family throughout the whole period. That state of things was one which might have been well adapted to former times, but was certainly not adapted to the circumstances of the present day. Since these works were established, the Gas-Works Clauses Act had been passed for the regulation of such undertakings, and it was found beneficial for the public that those regulations should be applied, which was not the case with private enterprises such as those of Mr. Malam. Among the many inconveniences arising from the absence of statutory

powers was that there was no limit to the price which might be charged, nor to the quality of the gas, nor to the profits of the parties supplying it; and there was no provision for testing the gas, nor any obligation to deposit accounts, so that consumers might know when to expect a reduction in the price.

Mr. DENISON said he thought his learned friend was rather miscalculating the nature of his duty at the present moment. He seemed to forget that the second bill, which was unopposed, and must therefore be taken as passed, contained all those controlling clauses which he thought were so desirable.

Mr. STEPHENS submitted that the two bills must be taken as competing bills.

Mr. DENISON denied the proposition, and said the King's Lynn Gas Bill must be taken entirely as an unopposed bill.

The CHAIRMAN said, until the committee had heard a little more of the facts of the case, they were hardly prepared to adjudicate upon the question.

Mr. DENISON said he did not ask the committee to adjudicate; he was merely informing them and his learned friend that, for the purposes of this inquiry, the second bill must be taken as unopposed. His learned friend had a petition before the referees against it, but it was decided that he had no *locus standi*.

The CHAIRMAN said he supposed the committee ought to have considered the second bill first. It appeared to him that, if they were to go into the present bill at all, they ought to have the statement of the learned counsel who supported it before them, in order to enable them to form a judgment. It was necessary that they should have the circumstances relating to the bill placed before them, and he did not think it was competent for Mr. Denison to come before them and say, "Here is another bill which you are afterwards going to consider, which treats of all these subjects, and which renders all these statements unnecessary." They must look at the provisions of the bill which was first in order before them.

Mr. DENISON said the probability was that the better way would be to take the other bill first.

Mr. STEPHENS objected. He said Mr. Malam, in his petition, treated the bills as competing bills. It was impossible for the committee to have before them the circumstances out of which the present bill arose without knowing how Mr. Malam had acted.

The CHAIRMAN said the committee were placed in the position of having this bill before them first, and it was impossible for them to consider it if they were told that there was another bill which cut the ground from under the feet of the promoters. He thought the inquiry must go on in the regular way.

Mr. STEPHENS resumed his address, and said one of the inconveniences arising from the existing state of affairs at Lynn was that Mr. Malam himself was not a resident in the town, and, though he was represented by a local agent, it was impossible business should be conducted as satisfactorily as it would be directly under the eye of the master. Indeed, great and serious dissatisfaction had arisen; complaints had been made by consumers, and by the Paving Commissioners, and in the newspapers, and as time went on, instead of getting better, matters grew worse. Evidence would be given of the bad quality of the gas, and of the insufficiency of the supply, and this bill originated in the desire of the inhabitants to get the control of gas affairs into their own hands. With that object a company was formed provisionally, which embraced the names of some of the largest consumers of gas in the town. Up to the time when the notices for this bill were published, no intimation had been given of an intention to promote another bill, and it was only at the last moment that the rival bill was announced; just in time to comply with the Standing Orders of Parliament. Early in December measures were taken to ascertain the feelings of the inhabitants; a public meeting was held at the town-hall, under the presidency of the mayor, and a full discussion took place, resulting in the unanimous adoption of a resolution, to the effect that the present supply of gas was exceedingly unsatisfactory, being insufficient in quantity, impure in quality, and too high in price; and that inasmuch as the works were in the hands of a private individual, who carried on his business without the control and restrictions of Parliament, it was expedient that a company should be formed for the purpose of obtaining a proper and satisfactory supply of gas to the town. In point of fact, the feeling of the inhabitants was strongly in favour of the course taken by the promoters of this bill, who proposed to supply the consumers with gas at a maximum price of 4s., and of an illuminating power of 14 candles. Against the bill a petition was presented by Mr. Malam, who was described as residing at Boulogne-sur-Mer. He said he was the owner of the works, and that he was himself promoting a bill in Parliament for the purpose of enabling him, along with others, to carry on those works, incorporating the Gas-Works Clauses Act, 1847, and other provisions, for the protection and accommodation of the public. The origin of that bill was this: Mr. Malam and his friends, finding that a bill had been deposited by the consumers, framed a bill upon the same footing, giving the same price and the same illuminating power, but widely differing in some other respects. The consumers had inserted in their bill a power of selling to the corporation on six months notice being given by the latter.

Mr. DENISON called the attention of the committee to the Standing Order which directed that in all cases of private bills in which no parties should have appeared on the petition against such bills, or, having appeared, should have withdrawn from opposition before the evidence for the promoters had been commenced, the committee should forthwith refer them to the Committee of Selection, who should deal with them as unopposed bills. Until he came into the committee-room he had every reason to believe that the second bill was an unopposed bill. The only opposition to it had been the petition of the corporation, which was now settled, and the corporation did not appear; therefore it seemed to him that the committee had no option but to send the second bill to the Unopposed Bill Committee. It was quite a mistake for his learned friend to talk about the two bills as competing bills.

The CHAIRMAN said it seemed to him that the point before the committee would be this—whether the consumers should manage their own affairs, or whether the company, in which Mr. Malam was to have a considerable part, should manage them.

Mr. DENISON submitted that this was a question which the committee could not try. The people of Lynn had a right to do it, but they were satisfied.

Mr. STEPHENS: Very far from it. We represent a very important section of the gas consuming community.

Mr. DENISON said his learned friend represented nobody at all, except the promoters of his bill.

Mr. STEPHENS said, according to the arrangements with regard to the second bill, it appeared that all the control the consumers were likely to get was about a sixth, for they were only to hold about £5000 or £6000 worth of shares out of something like £32,000. Mr. Malam's object was to form a company to whom he was to sell his works at a price not to be limited. It remained for him to say that the bill which he supported was a bill promoted in accordance with, and backed up by, local public opinion. The other bill was a bill promoted by Mr. Malam himself, the shareholders being guaranteed by himself that they should lose nothing in case the bill should not pass, but that he should pay all expenses. The point which he should ask the committee to decide would be whether or not they thought the consumers bill was one which ought to be passed in the interest of the town, or whether they ought to pass a bill for the benefit of a single individual. In the promotion of the present bill he disclaimed any intention or desire on the part of its authors to injure Mr. Malam; their object was to put an end to a close monopoly, and to obtain the control of the gas-works, with the understanding that, if hereafter required, they should transfer those works to the corporation.

The CHAIRMAN asked what position the corporation took in the matter of this bill.

Mr. STEPHENS said the corporation had entered into arrangements in the nature of clauses, and those arrangements could be carried out without coming again to Parliament.

The CHAIRMAN said he supposed the corporation were rather favouring than opposing the bill.

Mr. DENISON said the corporation treated both bills alike; there was the same power in both bills reserved to them to purchase.

The CHAIRMAN: Then they are neutral.

Mr. DENISON: I am just told that all this time we have been discussing the matter here the King's Lynn Gas Bill has actually gone to Mr. Dodson, the chairman of the Committee of Ways and Means, as an unopposed bill.

Mr. *Edward Durrant*, examined by Mr. RODWELL.

I am a land agent living at Lynn, a borough magistrate, one of the Town Councillors, and also a Paving Commissioner. In former years I was borough treasurer. I am thoroughly acquainted with the town of Lynn, and am chairman of the provisional directors of the company promoting this bill. I am a gas consumer, and have had occasion to complain of the gas supplied. The supply is sometimes good and sometimes bad. Whether it is from irregular pressure or the quality of the gas I am not prepared to say, because I am not a scientific engineer. In addition to this irregularity of supply, I have found the taps so corroded that they were set fast, and one could not turn them. The smell is sometimes very bad. I do not think I ever complained at the works, but I have had conversations with the collector about it. Sometimes after the taps have been put right they have got set fast again in ten days. I frequently hear my neighbours complain of similar inconvenience. As a Paving Commissioner, I do not think the supply to the public lamps has been satisfactory. Very frequently the town has been half in darkness. It has not been so much complained of for the last two years, but I can hardly say whether it is satisfactory at the present time, because my attention has not been called to it. My opinion is that the consumers desire to have the supply in their own hands. I think if the corporation were to take it, it would be very important for the borough. Mr. Malam is not bound to supply any one, and that is a state of things which ought to be done away with. A meeting on the subject was held, which had been convened by circular and advertisement. It was a public meeting, and I think, in addition to the circular, there were handbills. There were about 40 or 50 people there, which is a tolerably large number for Lynn on matters of that character. It was at first suggested that the price should be 3s. 6d. per 1000 feet, but was ultimately arranged to be 4s. as a maximum. It is from no spirit of hostility to Mr. Malam that I have acted in this matter. I helped to put down the original works for his father, in 1826 or 1827.

Cross-examined by Mr. DENISON: The works have been added to since then, but I am not competent to say whether they are kept in good order. I think the defective supply has arisen from the pipes and works not having been enlarged in accordance with the increased requirements. There was a decrease in the population of Lynn between 1851 and 1861 of 2000 or 3000, but there has been more gas required. I do not know that a new contract is prepared and about to be signed between Mr. Malam and the Paving Commissioners. There was a test made by the Paving Commissioners about twelve months ago. I cannot say that it was found equal to 15 candles. The Paving Commissioners do not understand testing gas. I suppose they could employ scientific persons, and there is no difficulty that I know of interposed by Mr. Malam to the gas being tested as often as required.

Mr. DENISON: What in your view is to become of Mr. Malam and his works?

Witness: My wish is that Mr. Malam should retain a large share in the works and the management, but that the power should be in the hands of the consumers. I think he no longer should have the entire control. There are about 110 or 120 shareholders in our company, and I think they have subscribed something like £9000. I first heard of Mr. Stevenson, the engineer, from Mr. Partridge, the soliciter, who is our secretary. There is a deposit to be paid on the shares of £1, and there is a condition attached that there shall be no further liability if the bill does not pass. I think it would be ridiculous for both bills to pass. If our bill should pass and Mr. Malam's should not pass, we should be willing to purchase his works. I will undertake to say that it should be done, or I would retire from the direction.

Mr. DENISON: You know, probably, that there is no such power sought in your bill

Witness: There is nothing to prevent it.

Mr. DENISON: In either case you will be satisfied if Mr. Malam's works are purchased, and the corporation have power to take them from you. Supposing Mr. Malam's works are purchased, what shall you want with the land you have scheduled?

Witness: I do not know that we should be bound to take the land. If I were to give really and truly my opinion, I should rather, setting aside Mr. Malam's interests, that his works were swept to the ground and new ones erected. I did not know anything of Mr. Stevenson till the public meeting in December. I do not know who employed him. He explained the objects of the meeting, and why there should be fresh works, on the ground that the present works were a monopoly and without statutory power. He did not mention any other place where rival companies had been started by himself. I confess I did not attend much to what he said. There has been a great deal of discussion in the Paving Board with regard to the renewal of the contract with Mr. Malam.

Re-examined by Mr. RODWELL: I want to see a real company established. I know of no guarantee that the corporation shall buy Mr. Malam's works. I should be unwilling to assent to any arrangement which should do Mr. Malam injustice. I have always had in view the determination that his works should be purchased at a fair valuation.

Mr. DENISON: It is no use to say that, because there is no provision in the bill.

Mr. RODWELL: That can be easily arranged.

By the COMMITTEE: I think the capacity of the pipes has been lessened in consequence of their corrosion.

The CHAIRMAN: Supposing you take Mr. Malam's works, you will have to tear up all his pipes and put down others?

Witness: I hardly know that, but I think in some places it should have been done years ago. I think the plant and apparatus for making the works are in a suitable place for the supply of the town. I have seen pipes taken up in the streets, and they have been evidently much corroded. It has been sometimes necessary to light candles in the evening, because ladies have not been able to see to work. The defective supply might possibly arise from irregular pressure; it does not necessarily show an insufficiency of gas at the main. I only know of one instance in which Mr. Malam refused to supply gas. That was a case in which the previous tenant left his bill unsettled, and Mr. Malam refused to supply his successor till it was paid. The population of Lynn is rather increasing. In 1851 it was 20,000, in 1861 it was 17,800, now it is about 18,000.

Mr. *James Marsters*, examined by Mr. STEPHENS.

I am deputy-chairman of the Paving Commissioners, and engaged in business as a flax and oil-cake manufacturer. I generally have during the night and day, at different times, 80 or 100 burners in use. I have continually to make complaints of the supply of gas at night. Frequently it is necessary to have lamps in use between eleven o'clock at night and daylight next morning. The complaints made by me are as to quantity, and not quality. Written official complaints have been made, besides verbal ones to the collector, but there has been hardly any redress. The taps often get out of order, and cannot be turned,

so that it is necessary to send for a gas-fitter to oil them and put them right. As an instance of the smallness of the supply, although I am continually asking for more gas, my bill in 1868 was £71 7s. 9d., and in 1869 (with some additional burners) only £58 10s. My experience at my private residence is identical with that at the works. All the parties who have taken shares in the new company have done so in the hope of getting a voice in the matter, and having the management in their own hands. Towards the end of last year I had some larger pipes put in at my works, with the view of obtaining more gas. The old pipes were found to contain a large amount of offensive matter. I have never met with gas in any other town which smelt so badly.

Cross-examined by Mr. RICHARDS: When I have complained I have written to the manager. The meters are supplied by the gas people themselves, but if we want more burners we put them on ourselves, and are not particular about informing the company; but, of course, we should expect a diminution of light to each burner if we exceeded the number of burners which the meters were capable of supplying. I have four meters. One may be a 3-light meter, and another a 4-light meter. What the size of the others may be I do not know.

Re-examined by Mr. STEPHENS: The gas people supply the meters, and they are the persons to put up extra meters when they are required. There can be no room for supposing that they were ignorant of the defective supply, because the complaints have been frequent and specific.

By the CHAIRMAN: I have understood that what are called 20-light meters are capable of ganging 30 lights. We have substantially not increased the number of lights since they put in the last meter. My impression is that the deficiency arises not from the choking of the pipes so much as from the pressure being taken off. You can see the light go down at particular times.

Mr. *Charles Miller*, examined by Mr. RODWELL.

I am managing partner of Messrs. Eyre and Co.'s brewery, which is the largest in Lynn, and with which I have been connected for 20 years. As brewers, our firm has a large consumption of gas. We have had occasion to complain both of the quantity and quality. On several occasions I have sent to the gas people to tell them that the taps have been stuck fast. Their man has come and removed the taps from the burners and cleaned them, and I have had a very good light the same evening. The supply is decidedly not satisfactory. The gas collector lives near me, and I have, therefore, had facilities for making complaints which other people have not had. My impression is that the defective supply arises from the deposit which accumulates in the pipes, because when that is removed we get a better light. I give my full support to the consumers bill.

Cross-examined by Mr. DENISON: I am a shareholder to the extent of 20 shares. My object is to get a better supply of gas. I should rather see the thing in the hands of a company than a corporation, because I have seen how the corporation manage matters. Of course, the members of the corporation are all consumers of gas, and therefore they would be interested; but I think companies, who have to make profits out of their undertaking, look after their affairs better than an irresponsible corporation.

Re-examined by Mr. STEPHENS: I took 20 shares in the new company, which I have given to my children.

The CHAIRMAN: Was that in case of anything wrong happening the liability should not fall upon you?

Witness: Not at all; my children have property of their own.

The CHAIRMAN: I think the committee do not require any further evidence of the faulty nature of this gas. It will not be necessary to call witness after witness to prove further that the gas is not of a pure or satisfactory description.

Mr. *T. S. Stevenson*, wholesale tea dealer; Mr. *Pridgeon*, jeweller; and Mr. *Cooke*, coal merchant, were, however, called by the promoters to support the evidence already given as to the quality of the gas.

Mr. RODWELL said he had other witnesses of the same character as those already examined, but after the intimation of the committee he would not call them, but proceed with evidence of another character.

Mr. *Richard Hall*, examined by Mr. RODWELL.

I have been in business for 25 years as a gas-fitter at Lynn, and have been employed by various customers to ease their taps. In the first 15 or 16 years I did not ease more than half a dozen pipes or taps, but in the last three years I have had over 150 to attend to. On one occasion, at Mrs. Marsters's, I took down a length of pipe two yards long that I could not blow through owing to its being choked with deposit. As soon as it was disturbed with a wire or anything I could blow it out, and it was black dust. I never found a deposit of that sort before the last three years. In the summer of 1869 I was called in to Mr. Thompson's to put a new gas-bracket in a bedroom, and in last January my man had to take it down. The joint of the bracket and the tap were found to be completely choked with this deposit. This necessity for calling in a gas-fitter so often increases the cost of the gas to the consumer.

Cross-examined by Mr. DENISON: I cannot account for the increased deposit in the pipes during the last three years.

Mr. *T. Andrews*, Mr. *J. Kent*, and Mr. *Chadwick*, gas-fitters, gave corroboratory testimony as to the fouling of the pipes.

Mr. *Robinson* wine merchant, having given evidence of a deficient supply of gas in his vaults, and of the necessity of frequently employing gas-fitters to ease his fittings,

The CHAIRMAN said: It becomes now time for me to say, with respect to these two bills, that with a view to the consideration of them, the Chairman of Ways and Means, under Standing Order 87, will inform the House to-night that the King's Lynn Gas Bill ought to be treated as an opposed bill, and will move that it be referred to this committee forthwith. The committee will now adjourn till to-morrow at twelve, and then we shall be in a position to see what course we shall take with respect to the bills. Of course we can hardly suppose there will be any opposition on the part of the House to a motion of this kind by the Chairman of Ways and Means. We may almost look upon it as a thing done. Then that will put us in a position to regard the second bill as an opposed bill, and we can treat the two bills as competing.

WEDNESDAY, MARCH 9.

The CHAIRMAN said: I have an intimation to make to the committee and to the parties interested in these bills, which will, perhaps, facilitate our proceedings a little. Here is an order made in the House last night to this effect:—

KING'S LYNN GAS BILL.—Mr. Dodson informed the House that in his opinion the King's Lynn Gas Bill, committed to the committee on group C of private bills, having become unopposed, should notwithstanding be treated as an opposed bill, it being expedient that it should be considered together with another bill—viz., the King's Lynn Consumers Gas Bill, in competition with which it is promoted, with an instruction to committee on group C of private bills to sit and proceed with the first-named bill accordingly.

Well, then, upon that I venture to suggest to the committee the following——

Mr. DENISON: If you will hear what my learned friend, Mr. Rodwell, has to say, I think it will save a good deal of trouble.

Mr. RODWELL: I think I should facilitate the proceedings of the committee if I were to inform the committee of the present position of matters. I was about to ask you to grant a little indulgence, which probably will result in the termination of these proceedings. Since the intimation conveyed yesterday that there would be an application to the House for leave to have the second bill considered as an opposed bill, the parties have taken both bills into their consideration, and an arrangement has been come to between them, which is not quite matured, but which is a *bonâ fide* negotiation all but completed, and the mode of carrying out the views of both parties seems to be this—that Mr. Malam's bill should pass and that the other bill should be withdrawn. Mr. Malam's bill will have a provision giving the corporation power to treat with him if they should think fit to purchase his undertaking, and there is to be a restriction placed on the number of shares and the interest which Mr. Malam is to have in the concern.

Mr. DENISON: Mr. Malam and his friends.

Mr. RODWELL: Yes; and his friends. So that, in point of fact, it becomes a consumers bill, Mr. Malam reserving his interest. I think probably you will have gathered, from the mode in which one or two witnesses gave their evidence yesterday, that such a result was likely to be brought about. I believe it will be brought about, and those who promoted the consumers bill will be perfectly satisfied if such an arrangement is carried out, because then there will be a real company, with no preponderance given to the one side or the other. Subject to your approval of that course, I shall ask you now to adjourn the proceedings—I hope only formally—till you sit again on some other bills.

The CHAIRMAN: Then it will be better to adjourn till Friday.

Mr. DENISON: Clauses will have to be prepared, and I should think an adjournment of two days would be very convenient.

The CHAIRMAN: Then when we meet on Friday I understand there is nothing to do but to go through the clauses?

Mr. DENISON: I hope so.

Mr. RODWELL: I believe it is a *bonâ fide* arrangement, and that it will be carried out between the paries.

The CHAIRMAN: I saw that was the only course things could take, and, of course, it will be much better, and save a good deal of expense, to have the matter settled amongst the parties themselves than in any other way. Then we will adjourn this matter till Friday, at twelve o'clock.

Mr. DENISON: Both bills must be put in the paper, because Mr. Malam's bill will have to be considered and settled as to the clauses.

FRIDAY, MARCH 11.

The clauses of the King's Lynn Gas Bill were this day settled in accordance with the arrangement mentioned on Wednesday.

Legal Intelligence.

COURT OF CHANCERY.—LINCOLN'S INN, TUESDAY, MARCH 8.
(*Before Vice-Chancellor Sir* R. MALINS.)

ATTORNEY-GENERAL *v.* THE LOCAL BOARD OF BISHOP STORTFORD.

This was a bill and information filed by the Attorney-General, at the relation of Mr. Richard Hunt, against the local board for the district of Bishop Stortford, asking for an injunction to restrain the defendants from permitting any of the sewage of the town or district of Bishop Stortford, or any water polluted with sewage or other noxious or offensive matter, to pass into the river Stort, through any of the sewers, drains, or channels under the control of the local board, in such a manner as to render the water of the river near the plaintiff's mill unfit for use by the plaintiff or his lessees, or a nuisance to or injurious to the health of the persons resident at the mill or in its vicinity. The bill stated that in the year 1867 the inhabitants of the town of Bishop Stortford resolved to place the town under the operation of the Public Health Act, 11 and 12 of the Queen, chap. 63, and accordingly an application was made to Her Majesty in Council, and an order was made on the 9th of February, 1867, that the Public Health Acts should be put in force in the town. Prior to the date of that order the Highway Board for the district had acted as a local board, but after that date the defendants were constituted a local board under the provisions of the Acts. It was stated that the defendants then proceeded to carry out a regular system of drainage for the whole of the district. The consequence of their proceedings, according to the bill, had been the creation of a nuisance. Affidavits were filed by the plaintiff and by other persons in support of the case made by the bill, and evidence was also given for the defendants, by which it appeared that they had made no alteration whatever in the sewers, and that no increase of sewage had been passed into the river; that the water was as pure now as it had been for many years, and that fish were plentifully caught at the present time. This bill was filed and an injunction applied for in July, 1868, but the motion was allowed by the plaintiff to stand over, and the cause only now came to a hearing. It was further stated that an Act of Parliament had been passed, which would come into operation on the 1st of July next, by which it was provided that no cesspools should be allowed to drain into the river Stort, and, consequently, that the granting an injunction now would be totally useless.

Mr. COTTON, Q.C., and Mr. CHARLES HALL appeared for the plaintiff; Mr. PEARSON, Q.C., Mr. HENRY JAMES, Q.C., and Mr. JACKSON for the defendants.

The VICE-CHANCELLOR said this was an information and bill, the bill being founded on the individual injury alleged to have been done to the plaintiff, and the information being founded on the injury alleged to have been caused to the public generally by the nuisance. The plaintiff was the owner of a mill in Bishop Stortford, which was let at a rental of £100 a year, and was occupied by a tenant named John Lawrence. The plaintiff himself lived some distance from the town, and had no interest in the place, except the rent he derived from the mill. The only injury, therefore, which he could sustain was in the loss of his tenant, who, he alleged, would leave the mill if the nuisance were not done away with, or in the reduction of his rent. The tenant had been cross-examined in court, and it appeared from his statements that he had first become tenant of the mill in 1865, and after residing there for a year he had taken a lease for 12 years, so that there were several years of the lease unexpired. Lawrence said he had been in ill-health occasionally, but he did not state that it was caused by the smell from the river, and he did not state that he had ever applied to have his rent lowered. The plaintiff in his affidavit said he had received many complaints in writing from the inhabitants of houses in the neighbourhood, but none of these written communications were produced; and the conclusion he came to was that such complaints were never made. As regarded the health of the town, the plaintiff was not personally interested in the question, and in his honour's opinion there was no case of private injury which would justify him in interfering. When the bill was first projected, the case was rested entirely upon private injury; but subsequently the plaintiff, in order to strengthen his case, had obtained the sanction of the Attorney-General to the information being filed on public grounds. That sanction was obtained, as was usual in such cases, upon an *ex parte* statement, and now the question was what injury was caused to the public by the conduct of the defendants. The bill charged that they had caused all the cesspools of the town to be drained into the river, that the sewage matter was deposited along the banks, and the unwholesome and offensive effluvia arising therefrom created an intolerable nuisance most prejudicial to the health of all persons residing in the neighbourhood; that the fish in the river, which were previously abundant, had been entirely destroyed, and the water rendered unfit for use; and that the river had, in fact, been converted from a pure and pleasing stream into a foul and noxious sewer, and the bed had been filled up with noisome deposits. Numerous affidavits had been read in support of these allegations, and evidence had been given on both sides, the result being that he was perfectly satisfied that the statements in the bill were grossly exaggerated. It appeared that the river was about 40 feet wide, that it was about 4 feet deep in the summer time, and about 6 feet deep in the winter. The consequence was that a very large body of water was constantly passing during the day. There was, however, no information given as to the quantity of sewage as compared with the quantity of water. There was evidence that during the summer of 1868, which was well

known to have been an exceptionally hot summer, there was some smell arising from the water; indeed, it was impossible that the sewage of a town containing 5000 inhabitants could run into a river without occasionally producing an unpleasant smell; but it appeared that none of the inhabitants themselves complained of the nuisance, and no one was found but the plaintiff, who did not live in the town, to raise these complaints. It had been distinctly stated in evidence that within the last few months a quantity of fish had been caught in the river, and it was also established beyond doubt that no fresh sewers had been drained into the water—that the sewage was in the same state it had been in for many years, and no material change had occurred during the last five years. All the statements made by the plaintiff turned out to be mere exaggerations. It was no doubt of great importance that the court should interfere in a case where a serious nuisance was created by pouring the sewage of a town into the pure water of a river; but, on the other hand, it was quite as important that the court should refuse to interfere where a proper case was not raised. It was clear from the evidence that there was no justification for filing this information, and what possible reason the plaintiff could have had for taking up the case when he had no interest in it, and when none of the inhabitants sided with him, he could not conceive. The Act of Parliament which had already been passed, and which would come into operation on the 1st of July next, had, in fact, provided a remedy for any complaints that might be made, and after that period it would be the duty of the authorities to prevent the sewage from being passed into the river. Under any circumstances, therefore, it would have been completely useless to grant an injunction now. In his honour's opinion, the case had entirely failed, and the bill must be dismissed. Then as to the costs of the information, if it were dismissed without costs it would be necessary for the defendants to raise the costs by a rate upon the inhabitants of the town, which would be a great injustice to them. He thought, therefore, the costs ought to fall upon the plaintiff, and the bill and information must be dismissed with costs.

Miscellaneous News.

GREAT CENTRAL GAS CONSUMERS COMPANY.

A Special Meeting of the Shareholders of this Company was held at the London Tavern, Bishopsgate Street, on Tuesday, March 8—Alderman DAKIN in the chair—to consider certain suggested alterations in the company's bill now before Parliament, and also a scheme for the amalgamation of this company with the Chartered Gaslight and Coke Company.

The SECRETARY (Mr. R. M. Massey) having read the notice convening the meeting,

The CHAIRMAN said: Gentlemen, when we last met you on the 7th of January, it was for the purpose of submitting to you a bill which had been drawn for the purpose of being laid before Parliament during the then ensuing session of the Legislature. My friend, Sir Thomas Gabriel, who filled the chair in my absence on that occasion, stated to you that we should prosecute that bill in Parliament, and that we should likewise do the best we could in order to avert any opposition to the carriage of the bill. You will recollect the bill proposed that we should have power to deal with the surplus profits of the company in the way of liquidation of the defalcation account. The 12th clause of the bill provided that we should put the balance of the profits accruing at the end of the year, after paying a dividend of 5 per cent., to the credit of that defalcation account, amounting to something like £40,000, and that out of future profits we should pay a dividend of 5 per cent. to the shareholders, the other 5 per cent. going to the further and complete liquidation of the defalcation account. The bill likewise proposed that we should have power to raise £30,000 of new capital for the purposes of the company. That bill, gentlemen, was read to you, and it received your approval, and consequently, as we promised to do, we sought an interview with the Gas Committee of the Corporation of London, in order, if possible, to avert their opposition, and likewise, if possible, to avoid the necessity for that large and—even in the presence of Mr. Baxter I may say—fruitless expenditure which always ensues from parliamentary litigation and strife. I have the satisfaction of stating that, in accordance with our wish, the Gas Committee of the corporation met a deputation from our board, consisting of myself and Sir Thomas Gabriel, and we discussed this question with them. We put our case before them to the best of our ability, and I must say they listened with great attention to our statements, and after due consideration they agreed that they would withdraw their opposition to our bill with one exception—that of the interest on the new capital. That, gentlemen, at any rate, is a very satisfactory fact, that after the long-continued efforts we have made for the benefit of the citizens of London, and after so much strife and that which is disagreeable, we are able to come at last to agreement and concord. I will read a letter addressed to me on the subject on the 23rd of February, and signed by the Remembrancer, in which he says: "Referring to the meeting which you and Sir Thomas Gabriel had with the Special Sub-Gas Committee of the corporation on Friday last, and to your interview with me after that meeting, I am directed by the Gas Committee, to whom the sub-committee reported to-day, to inform you that the committee will not object to clause 12 of the bill now in the House of Lords, which provides that the whole of the gross profits of the company for the year 1869, after paying the shareholders a dividend of 5 per cent., may be applied towards reducing the defalcation of the company's clerk, and that they adhere to the resolution of the sub-committee that the additional capital of £30,000 must be raised by a 6 per cent. preference stock, or a 7 per cent. ordinary stock." Therefore, with that alteration, the Gas Committee will not oppose our bill. The bill is now before the House of Lords. It is delayed for the present, till the issue of another offer made to you is determined; but, as I said, the bill now before the House of Lords is virtually an unopposed bill; the shareholders therefore know that if they prefer we should remain an independent company, they have the means by this bill of doing so, in which case they will have 5 per cent. dividend on their capital for the year 1869, the balance of the profits of that year being placed to the credit of the defalcation account, amounting to about £40,000; and that after that period they will have 5 per cent. dividends, while the other 5 per cent. will go to the liquidation of the remaining £28,000 or £30,000, until it is cleared off entirely. That is one position in which the shareholders may, if they so elect, find themselves. But, gentlemen, the day after this meeting we had summoned a board specially for the purpose of considering a proposal sent to us from the Chartered Gas Company, now united with the City of London Gas Company. The shareholders will remember that when the last City Gas Act—the Act of 1868—was before the committee of the House of Commons, Mr. Cardwell, who was the chairman, took a very strong view as to the policy, and indeed as to the necessity of the several gas companies becoming amalgamated. It was urged in every possible way in the committee, but at that time we felt that to go into an amalgamation with the other companies having larger districts, and having affairs that we were not cognizant of, was not a safe position for us; and, inasmuch as we then saw our way to pay you 10 per cent. without any drawback, we thought it was not desirable to entertain such a proposition. We did not therefore, in deference to the wishes of the committee, give our assent to the proposal for an amalgamation. The bill of 1868 was passed, and passed with the clauses I will now read to you. [The chairman read clauses 18, 19, and 20.] These clauses in the Act of Parliament enable the gas companies of their own motion, if they see fit so to do, to frame a scheme of amalgamation, which scheme they are required to submit to the Board of Trade. The board in their turn having submitted the scheme to the public authority, which in this case is the Corporation of London, and having considered any objection they may make to it, have power by their fiat, and by virtue of an order by the Queen in Council, to make that scheme as binding as if it were an Act of Parliament. You see, then, that facilities were given for effecting an amalgamation such as is now suggested to us by the Chartered and City Gas Companies. The machinery is, therefore, at hand, if you see fit to adopt the proposal. The proposal of the united companies is this: that they shall receive all our assets and take all our obligations upon themselves, as the accounts are made up to the end of 1869, and that they shall give to you, the shareholders, a dividend for the year 1869 of 7½ per cent., and that they shall thereafter give you a preferential dividend of 10 per cent.—(cheers)—or the maximum rate adopted by Act of Parliament, which is now 10 per cent. Now, gentlemen, we were scarcely prepared for an offer of that kind, although there had been intimations given to us—informal intimations—as you heard at the last meeting, that the other companies thought it desirable, as they were incurring very large expenditure, and were erecting very comprehensive works for the manufacture of gas, that an amalgamation of our company should take place, and that they saw their way, with the addition of our £100,000 of rental, to take upon themselves to give our shareholders a 10 per cent. preference dividend. Well, then, when this offer came before us, we at once sent an answer back to the Chartered and City Companies that we had received their offer, and would immediately call a meeting of our proprietors for the purpose of submitting it to them. Of course it was our duty to see exactly, when a preference dividend was offered to us, upon what security that preference rested, and I have here a document handed to our board by authority which gives precisely the condition of the finances of the two companies, and which shows how we shall stand in future if this offer is accepted. The preference capital already existing of the Chartered and City Companies is as follows:—The Chartered Gas Company have a mortgage debt of £300,000, at 4½ per cent.; they have also other preference shares—B shares—to the extent of £250,000. They have also power under their Acts to issue debentures—which, though not issued, we take for our purpose as issued, in order to see the extreme amount of preference in their case—of £162,500. The only preference which the City Gas Company have are bonds to the extent of £60,000. This makes a total amount of preferential capital which would come before our guaranteed 10 per cent. of £772,500. The interest required for this preferential capital is £37,875. Now, against this we have the profits of the year 1869. The net profits of the two united companies for the year 1869 are given to us as £75,714. From this net profit we deduct the preference and mortgage interest, which amount to £37,875, and there is a sum left of £37,839. Then to this we must add the net profits of the Great Central Company, which, taking the absolute amount to June, 1869 (£16,665), and the estimated amount to Christmas, which will certainly be equal to that, will make a total of £33,330. Deducting from this the 3d. in the price of gas, and the additional cost of the increased illuminating power, it gives the Great Central Company's profits as £25,330. This, added to the £37,839, makes a total profit of £63,169. From that sum has to be deducted the interest on the £66,000 debentures, at 5 per cent., £3300; leaving £59,869, or, in round numbers, you may say £60,000, to meet our preference dividend of £20,000. These figures are absolute from the accounts, except for the last half year of our own, which are not yet made up, leave a surplus beyond our preference dividend of, in round numbers, £40,000. We come after their preference dividend, as I have described; but then below us again there are the ordinary share capitals of these companies. There is the Chartered ordinary share capital of £870,000, and there is the City Company's ordinary share capital of £390,000; so that there is £1,260,000 below us, and that £1,260,000 of capital can get no dividend until our preferential 10 per cent. is provided for. Whether, therefore, we look to the preference or to the share capital, we have come to the conclusion that our preferential dividend is amply secured. Now, gentlemen, the board have thought it their duty to put before you these two conditions of things. You have an unopposed bill now before Parliament, which has been already described to you, the effect of the passing of which, you know, would be to give you 5 per cent. for the past year, instead of the 7½ which the Chartered Company propose to give you, and you would then have to work out your 10 per cent. at some interval under that bill, whereas the Chartered Company propose to give you an immediate preference 10 per cent. I do not know that I can put the matter more clearly before you. This is a very important crisis in the concerns of the company. I speak for myself and for my brother directors when I say that it would be with some regret, after 20 years management, and now that we see our way to recovery from the sad disaster which lately befell us, and of which I hope we shall hear no more, if we should see the company lose its independent existence; but if you think the step is one which is best for your interests, we shall be very happy and willing to carry out the proposal.

Mr. MOSCROP said he represented nearly 1000 shares, and had come nearly 200 miles to give his sanction to the proposal. It was thought well of by the shareholders in Lancashire, and they had requested him to move the following resolution, which he had much pleasure in doing:—"That the directors be authorized to accept and take all necessary measures to carry into effect an amalgamation with the united company, consisting of the Chartered and City Gas Companies, upon the terms of receiving a dividend of 7½ per cent. for the year 1869, and a 10 per cent. preference dividend per annum thereafter, or at the maximum rate of dividend allowed by Parliament."

Mr. ATTRELL seconded the motion.

Mr. KING said when the affairs of the company were looking gloomy a year ago, he advised the shareholders not to be downhearted, but to stick to the ship. He was proud to think the remarks he then made had some effect, and he now congratulated them on the state of affairs presented by the chairman, by which their 10 per cent. was secured to them.

Mr. LONDON hoped that in the proposed arrangements care would be taken of the staff, and that the officers of the company would not be "left out in the cold."

The CHAIRMAN said that the proposition was that all the officers, with one exception, should be taken over by the united companies. Of course, there could not be two secretaries, and therefore Mr. Massey's services would not be required, and he should have something to propose with respect to that gentleman as soon as the present motion was carried. The directors had not been unmindful of the interests of the officers, for they felt that in any change of this sort those who had served them well and faithfully for many years ought to be properly cared for.

A SHAREHOLDER said he did not see the necessity for an amalgamation, and would rather see the Great Central Gas Company maintain an independent existence.

Another SHAREHOLDER expressed a hope that the members of the board would not suffer by the proposed change.

The CHAIRMAN remarked that the same care and attention which the directors had bestowed upon the staff they would endeavour to bestow upon themselves.

Mr. NODES said it might be true that it was for the interests of the company to accept the proposition, but he thought before coming to a conclusion on the subject the shareholders should have had some statement in print, so that they might be able to form a judgment upon it. He declared that, for his part, he did not even know whether the companies making the offer were solvent or insolvent. No doubt they thought they would make a good thing out of the Great Central Company, or they would not be so ready to accept them.

Mr. H. P. STEPHENSON could not conceive how any shareholder, having his

own interests at heart, could refuse the proposal before the meeting. The company were limited by their Act to a maximum dividend of 10 per cent., and that dividend had on several occasions been reduced by unfortunate circumstances. It was cut down by the misfortune of the Wood Street fire, and it was cut down by a recent misfortune to which he would not more particularly allude. But now they were offered a guaranteed dividend of 10 per cent., and it was monstrous to refuse the offer. He could not conceive how any one in his senses could doubt the propriety of accepting it. No doubt the united companies saw their way, by the economies they could introduce, to make the amalgamation pay, and as to the solvency of the companies there could not be a moment's question. He strongly advised the meeting not to be misled, by the suggestion of any doubts of that nature, into the rejection of a proposal which was so manifestly to their interests.

Mr. STOKES also urged the shareholders to adopt the resolution.

The motion was then put, and carried unanimously.

Mr. BECK (governor of the Chartered Company) said he did not rise before to speak, as he thought it would be improper, in the position which he occupied, to attempt to bias the shareholders in any way, but in consequence of an observation made by one of the speakers as to the solvency of the Chartered Company, he should like to assure that gentleman that the company was about as solvent as any in London. The best proof of this was afforded by the fact that they had just raised £300,000 from a private company at 4½ per cent., and issued £250,000 of preference shares at 5 per cent. He thought very few companies in London could say as much as that. Another thing he wished also to say—viz., that the Chartered Company firmly believed that when they had their Beckton works in full operation, they would save at least £50,000 a year in the cost of coals and working expenses. In reply to an inquiry, he added that the original shares of the Chartered Company were paid up with the exception of a call of £5, amounting to £30,000.

The CHAIRMAN said he thought from the figures he had read there could be no doubt as to the security which the Chartered Company offered. A question was asked by an honourable proprietor as to the staff of the Great Central Company should the amalgamation take place, and he had already informed the meeting that the only officer who would be displaced was the secretary. There could not be two secretaries, and therefore Mr. Massey's services would not be required. With reference to that gentleman, he had now to propose—"That in view of Mr. Massey's twenty years service as secretary of the company, and of the proposed amalgamation with the Gaslight and Coke Company, a retiring allowance of £500 per annum, as recommended by the board, be granted to Mr. Massey should his future services be dispensed with." (Cheers) He was quite sure that the feeling already expressed, that no person should be damaged by the proposed change, would induce the meeting to receive this proposition of the board favourably.

Mr. MOSCROP seconded the motion, which, on being put to the vote, was carried unanimously.

A SHAREHOLDER hoped that if, upon the amalgamation taking place, any of the other officers of the company should be dispensed with, their interests would not be neglected. He felt that they had done what was quite right and proper by the secretary, and he trusted that the directors would protect the other officers to the utmost of their power.

The CHAIRMAN, in reply, said he had the utmost confidence that whatever was right and proper in the future would be done by the gentlemen who would in future control the affairs of the company. Their interests could not be in more honourable hands. When the scheme was completed there would be a meeting of the shareholders, at which it would be submitted for approval.

A SHAREHOLDER inquired what the amalgamated companies would do with two engineers.

The CHAIRMAN said he took it that the Great Central works would be carried on for some considerable time, and he knew that the value of Mr. Harris's services was so thoroughly understood that he would be permanently welcomed by the new company. There was also their chief inspector, Mr. Pontifex, whose services would continue to be extremely valuable.

The SECRETARY (Mr. Massey) said: Gentlemen, I beg sincerely to thank you for your kindness in passing so handsome a recognition of my services. I shall always retain a grateful recollection of the many kindnesses I have received at the hands of my board and the shareholders, and though not holding the same position, should the amalgamation take place, our interests will not be severed.

Mr. STOKES congratulated the chairman on seeing him safe again in England, and proposed a vote of thanks to him and his brother directors for their services.

The motion having been seconded, was carried unanimously.

The CHAIRMAN appropriately acknowledged the vote, and the proceedings terminated.

SCHEME FOR THE AMALGAMATION OF THE CITY OF LONDON GASLIGHT AND COKE COMPANY WITH THE GASLIGHT AND COKE COMPANY,

IN PURSUANCE OF SECTIONS 18 TO 24 INCLUSIVE OF THE CITY OF LONDON GAS ACT, 1868, AS FINALLY APPROVED BY THE BOARD OF TRADE.

Commencement of Scheme.

1. This scheme shall come into operation on the first day of January, one thousand eight hundred and seventy, which date is in this scheme referred to as the commencement of this scheme.

AMALGAMATION.

The City of London Gaslight and Coke Company Amalgamated with the Gaslight and Coke Company.

2. On the commencement of this scheme, and subject to the provisions thereof, the City of London Gaslight and Coke Company and the Gaslight and Coke Company (which two companies are in this scheme referred to as "the amalgamating companies") shall cease to exist as separate companies, and the undertaking of each of the said two companies shall from and after such commencement be amalgamated and form part of one and the same undertaking.

Incorporation of Amalgamated Company.

3. The members of the amalgamating companies respectively at the commencement of this scheme, and all persons and corporations who may become entitled to shares in the company amalgamated by this scheme, are by this scheme united into one company by the name of "The Gaslight and Coke Company" (in this scheme referred to as the united company), and by that name shall be one body corporate with perpetual succession and a common seal.

Works and Properties of the two Companies vested in the United Company.

4. All the gas-works, buildings, mains, pipes, meters, plant, works, and conveniences, lands, estates, moneys, property, and effects, choses in action, claims, and demands whatsoever, of or to which the amalgamating companies respectively are, by virtue of any Act relating to either of such companies, or otherwise howsoever, at the commencement of this scheme, seized or possessed, or in any way entitled at law or in equity, or otherwise howsoever, with the appurtenances, shall, subject to the provisions of this scheme, be vested, on the commencement of this scheme, in the united company, to the same extent and for the same estate and interest for which the same respectively is and are at such commencement vested in either of the said amalgamating companies.

Conveyances, Contracts, &c., preserved.

5. All purchases, sales, conveyances, securities, agreements, and contracts before the commencement of this scheme made or entered into under the authority of any Act or Acts relating to either of the amalgamating companies shall be as valid and effectual to all intents and purposes for, against, and with respect to the united company as if the same had been made and entered into with the united company instead of with either of the said amalgamating companies.

Sales, &c., of Shares to remain in force.

6. All sales, transfers, and dispositions before the commencement of this scheme made or executed under the authority of any Act or Acts relating to either of the amalgamating companies, of or with respect to any share or shares of the respective capitals of such companies, shall, for the purposes of this scheme, be as valid as if this scheme had not been confirmed.

Mortgages and Bonds of Companies to be a Charge on United Undertaking, with Priority on the Amalgamated Undertakings respectively.

7. The debts and liabilities of the amalgamating companies respectively which are secured on mortgage, bond, or debenture, and are subsisting at the commencement of this scheme, shall be a charge upon the united undertaking of the united company, and shall be as valid and effectual in relation to the united company as if such mortgages, bonds, or debentures had been granted by the united company instead of by either of the said amalgamating companies, but subject and without prejudice to the right of the holders of mortgages, bonds, or debentures granted by the City of London Gaslight and Coke Company to a priority of charge upon the undertaking of the said City of London Gaslight and Coke Company, and to all the rights, privileges, and remedies belonging to or incident to such mortgages, bonds, or debentures respectively; and, as respects the holders of mortgages in the Gaslight and Coke Company, subject, and without prejudice to the rights of such holders, to a priority of charge upon the undertaking of the said Gaslight and Coke Company, and to all the rights, privileges, and remedies belonging to or incident to such mortgages respectively; and for the purposes of such priority the undertaking of each of the said amalgamating companies shall, so long as any of the said mortgages, bonds, or debentures affecting such company subsist, be deemed to be a separate undertaking.

Debts to be Paid.

8. Except as is in this scheme otherwise provided, all debts and money due on the commencement of this scheme to either of the amalgamating companies, or to any person on their respective behalf, shall be paid to the united company, and shall be recoverable by the united company; and, except as aforesaid, all debts and money on the commencement of this scheme due by or recoverable from either of the amalgamating companies, or for the payment of which they were or but for this scheme would respectively be liable, shall be paid, with all interest (if any) due and payable, or accruing for the same, by, or be recoverable from, the united company.

Rates to be Payable to United Company instead of to Amalgamating Companies.

9. All rates, rents, and charges payable to either of the amalgamating companies, by virtue of any Act relating to such company, shall be payable to the united company, and shall be recoverable by such company by the same ways and means, and subject to the same conditions, by and subject to which the same would have been recoverable by either of the amalgamating companies if this scheme had not been confirmed.

Resolutions, &c., continued.

10. All resolutions, orders, and proceedings of general meetings and boards of directors which, on the commencement of this scheme, are binding on either of the amalgamating companies, or their respective shareholders, directors, officers, or servants, or any of them, shall, so far as the same are applicable, continue in full force, and be binding on the united company, and their shareholders, directors, officers, and servants accordingly, until the same be varied, altered, or repealed by order of a general meeting, or of a board of directors, as the case may require.

Books to be Evidence.

11. All books, accounts, and documents which would have been evidence in respect of any matter for or against either of the amalgamating companies, shall be admitted as evidence in respect of the same or the like matter for or against the united company.

Actions not to Abate.

12. Nothing in this scheme shall cause the abatement, discontinuance, or determination of, or in anywise prejudicially affect any action, suit, or other proceeding at law or in equity commenced by or against either of the amalgamating companies either solely or jointly with any other company or with any person before the commencement of this scheme and then pending, but the same may be continued, prosecuted, or enforced by or against the united company either solely or, as the case may require, jointly with such other company or with such person; and all persons committing offences against any of the provisions of any Act relating to either of the amalgamating companies before the commencement of this scheme may be prosecuted, and all penalties incurred by reason of such offences, and all other penalties (if any), and all damages, costs, and expenses, may be sued for and recovered in like manner as if this scheme had not been confirmed, the united company being in respect of all such matters considered as identical with the amalgamating company.

Registers of Amalgamating Companies to Subsist until Replaced.

13. All registers of shares, mortgages, and bonds of either of the amalgamating companies, and all registers of transfers thereof respectively, and all shareholders address-books, and all certificates of shares of and in either of such companies, which are valid and subsisting at the commencement of this scheme, shall continue to be valid and subsisting, and shall have the same operation and effect as before such commencement, unless and until new or altered registers, books, and certificates respectively are substituted in their stead in pursuance of this scheme.

Officers continued.

14. Every officer and servant appointed by either of the amalgamating companies in office, or employed at the commencement of this scheme, shall, until removed in pursuance of this scheme, hold their respective offices and employment, and be deemed to be officers of or persons employed by the united company, and they and their respective sureties (if any) shall, for the purpose of any liability incurred by them respectively in respect of such appointment and suretyship, be deemed respectively to have been appointed by and become bound to the united company in the place of such amalgamating company.

General saving of Rights and Claims.

15. Except only as is in this scheme otherwise expressly provided, everything before the commencement of this scheme done, suffered, and confirmed respectively under or by virtue of any Act relating to either of the amalgamating companies, shall be as valid as if this scheme had not been confirmed; and the confirmation of this scheme shall accordingly be subject, and without prejudice, to everything so done, suffered, and confirmed respectively; and to all rights, liabilities, claims, and demands, both present and future, which would be incident to, and consequent on, any and every thing so done, suffered, and confirmed respectively; and with respect to all such things so done, suffered, and confirmed respectively, and to all such rights, liabilities, claims, and demands, the united company shall, to all intents and purposes, represent each of the amalgamating companies.

CONSTITUTION AND REGULATION OF UNITED COMPANY.

Provisions of Existing Acts continued.

16. The Acts relating to or affecting the amalgamating companies respectively, or their respective undertakings in force at the commencement of this scheme, shall, except so far as the same are varied by or inconsistent with this scheme, remain in full force; and all rights and powers by such Acts or any of them conferred on and vested in either of the amalgamating companies, in relation to the undertaking of such company, may be enjoyed and exercised by the united company in relation to the undertaking of such amalgamating com-

pany; and all matters which might have been done, continued, or completed by either of the amalgamating companies, or their directors, officers, or servants, under or by virtue of those Acts, or any of them, may be done, continued, or completed by the united company, and their directors, officers, and servants, as the case may be; and every Act, so far as it relates to or affects either of the amalgamating companies or its undertaking, shall be read as if the name of the united company had been used therein in relation to such undertaking, instead of the name of the amalgamating company; subject to this proviso, that in the event of the provisions of any Act relating to the City of London Gaslight and Coke Company being inconsistent with those of any Act relating to the Gaslight and Coke Company, the provisions of the last-mentioned Act shall be deemed to be in force with respect to, and shall be observed by, the united company.

Capital.

17. The capital of the united company shall be one million nine hundred and fifty thousand pounds (being the aggregate authorized capitals of the two companies previously to the commencement of this scheme), divided into one hundred and ninety-five thousand shares of ten pounds each, whereof one hundred and eighty-five thousand shall be designated as A shares, and the remaining ten thousand, representing the sum of one hundred thousand pounds, shall be designated as B shares.

Shares in United Company.

18. The shares in the united company shall be appropriated as follows (that is to say):—

Every shareholder in the Gaslight and Coke Company shall, in respect of every fully paid-up share belonging to him in such company, be entitled to and shall be registered as the holder of five A shares in the united company fully paid up; in respect of every share belonging to him in the Gaslight and Coke Company on which forty-five pounds has been paid up, be entitled to and shall be registed as the holder of four A shares in the united company, fully paid up, and one A share in such company, with five pounds paid up thereon;

Every shareholder in the City of London Gaslight and Coke Company shall, in respect of every A share belonging to him in such company, be entitled to and be registered as the holder of two A shares in the united company fully paid up; in respect of every B share belonging to him in the said City of London Gaslight and Coke Company, he shall be entitled to and shall be registered as the holder of one B share in the united company fully paid up; in respect of every fully paid-up "new share" belonging to him in the City of London Gaslight and Coke Company, he shall be entitled to and shall be registered as the holder of one A share in the united company fully paid up; and in respect of every "new share" belonging to him in the City of London Gaslight and Coke Company not fully paid up, he shall be entitled to and shall be registered as the holder of one A share in the united company, with five pounds paid up thereon:

Every share so appropriated as aforesaid shall vest in the person or corporation entitled thereto on the same trusts and subject to the same limitations as to the amount of dividend payable thereon, and to the same powers, provisions, declarations, agreements, and charges as at the commencement of this scheme affect the then existing shares in the capital of the amalgamating company for which respectively they are substituted, and so as to give effect to and not revoke any testamentary disposition.

Holders of Shares in United Company liable to pay Calls in respect of Uncalled Capital of Amalgamating Companies.

19. The holder of any share in the Gaslight and Coke Company, in respect of which forty-five pounds per share has been paid, and the holder of any "new share" in the City of London Gaslight and Coke Company on which five pounds has been paid, shall respectively be liable to calls in respect of each such share to the same extent, and payment of the same may be enforced by the united company in the same manner as if this scheme had not been confirmed.

The United Company to issue Certificates of Shares, and may require Old Certificates to be Exchanged.

20. The united company shall from time to time, whenever thereunto requested, issue to the proprietors of shares in the amalgamating companies certificates of shares in the united company, in lieu of and in exchange for the certificates of shares in the said amalgamating companies respectively, and the united company, if and when they think fit, may require the several proprietors of shares in the said amalgamating companies respectively to exchange the certificates of shares in the said amalgamating companies held by them on the commencement of this scheme for new certificates under this scheme.

Borrowing Powers of United Company.

21. Any powers of borrowing which might have been exercised by either of the amalgamating companies if this scheme had not been confirmed, may be exercised by the united company in the same manner and to the same extent as the same might have been exercised by such amalgamating company if this scheme had not been confirmed; and all mortgages, bonds, or debentures issued after the commencement of this scheme by the united company, whether by renewal of previous mortgages, bonds, or debentures, or otherwise, shall be issued by and in the name of the united company, and shall be a charge upon the united undertaking, without any priority (*inter se*) on account of date of creation or otherwise.

As to Moneys due to or from the Two Companies respectively, on "Revenue Account" at the Time of Amalgamation.

22. All moneys due to or from either of the amalgamating companies on revenue account, shall, as between such company and the united company, be deemed to be respectively assets and debts of the amalgamating company and the revenue account of the amalgamating companies respectively, made up to the date of the commencement of this scheme, and audited by the auditors of such companies respectively, and approved by the auditor appointed by the Board of Trade under the City of London Gas Act, 1868, shall be adopted by the united company; and the united company shall pay to each of the amalgamating companies the balance appearing by such account to be due to each such company on the thirty-first day of December, one thousand eight hundred and sixty-nine, or at such other time or times as may be agreed upon between the united company and the amalgamating company to which the balance is payable, and when all claims on the revenue accounts of the amalgamating companies respectively for the year ending the thirty-first of December, one thousand eight hundred and sixty-nine, including the dividends payable to the shareholders of such companies, are discharged, the balance remaining on the said accounts respectively shall be carried to the credit of the revenue account of the united company.

Directors.

23. The directors of each amalgamating company, in office at the commencement of this scheme, shall be the first directors of the united company.

Subject to the provisions of this section, the united company may at any time by resolution reduce the number of its directors.

Until the number of directors is reduced by resolution of the united company, or otherwise, below nine, the company shall not, nor shall the directors, supply any vacancy in the number of directors which shall have been occasioned by death or resignation, or by disqualification under sections eighty-five and eighty-six of the Companies Clauses Consolidation Act, 1845. From and after the time when the number of the directors of the united company has been reduced to nine, the number of such directors shall be not less than five nor more than nine.

Maximum Remuneration of Directors.

24. The maximum amounts payable in each year as the remuneration of the directors of the united company shall be those set forth in the schedule hereto: the amount from time to time so payable to the directors may be divided among such directors as they may determine.

SCHEDULE ABOVE REFERRED TO.

Maximum Amounts payable to Directors.

In the 1st year after the commencement of scheme	.	.	.	£4500
„ 2nd „ „ „	.	.	.	4300
„ 3rd „ „ „	.	.	.	4100
„ 4th „ „ „	.	.	.	3900
„ 5th „ „ „	.	.	.	3700
„ 6th „ „ „	.	.	.	3500
„ 7th „ „ „	.	.	.	3300
„ 8th „ „ „	.	.	.	3100
„ 9th and subsequent years	.	.	.	3000

Auditors.

25. The auditors of the two amalgamating companies in office at the commencement of this scheme shall continue in office until the first general meeting held after the expiration of one year from the commencement of this scheme. At that meeting the shareholders of the united company shall elect not less than two nor more than three auditors, and thenceforth the number of the auditors of the united company shall be not less than two nor more than three; the maximum amount payable in each year as the remuneration of any auditor shall be fifty pounds; any person being an auditor of either of the amalgamating companies at the time of the amalgamation, who is not elected an auditor of the united company after the expiration of the said period of one year, shall be entitled to a gratuity not exceeding one year's salary, if voted by the united company.

Compensation to Officers removed from Office.

26. Every secretary, engineer, accountant, collector, or other salaried officer of either of the amalgamating companies, who, at the commencement of this scheme, has been employed by either of such companies for ten years or more, and whose office or employment is abolished, or whose services are dispensed with in consequence of this scheme, shall be paid by the united company during his life an annuity, payable half yearly, equal, if he have been in the service of either of the amalgamating companies twenty-five years or more, to two-thirds of the annual emolument derived by him from his office at the commencement of this scheme; and with respect to any such person who has been in such service less than twenty-five years, the said annuity shall be diminished, at the rate of one twenty-fifth part for every year less than twenty-five years during which he has been in such service; any annuity payable under this section may, with the consent of the united company and of the annuitant, be compounded for by payment of the principal sum for which an annuity of like amount would be purchaseable under the table regulating the granting of annuity by the Postmaster-General.

Compensation when Annuity not payable.

27. The united company may pay a sum of money by way of compensation to any salaried officer whose office is abolished, or whose services are dispensed with in consequence of this scheme, and who is not qualified to receive an annuity under the last preceding section: Provided, that such sum shall in no case exceed one year's emolument, except with the special sanction of the Board of Trade.

Gratuity payable to Salaried Officer.

28. The annuity or sum of money payable under either of the last two preceding sections may, with the special sanction of the Board of Trade, be increased, in the case of any officer who has rendered special services to either of the amalgamating companies, to a larger amount than is authorized in those sections respectively.

Gratuity to Weekly Servant.

29. A gratuity not exceeding three months pay may be given to any weekly servant whose services may be dispensed with in consequence of this scheme.

Decision as to Abolition of Office.

30. The decision of the united company as to whether an office or employment has been abolished, or whether any services have been dispensed with in consequence of this scheme, shall be final and without appeal in every case.

United Company may Sell and Dispose of Lands, &c.

31. The united company may from time to time sell and dispose of any lands and plant which may not be required for the purposes of the undertaking of the united company, and a resolution of a general meeting of the united company that any of the same lands or plant are not so required, shall be sufficient evidence thereof; the proceeds of any and every such sale, and any other sums not received on revenue account, shall be applied only to the purposes to which capital is properly applicable, unless otherwise provided in any special Act, and until required to be so applied shall be invested, and the interest on such proceeds and sums shall be carried to the revenue account of the united company; and the amount of capital, if any, which the united company may for the time being have power to issue, shall be deemed to be reduced by the amount of such proceeds or other sums.

Notice by Board of Trade to United Company to cease Manufacture and Storeage of Gas in the City of London.

32. The Board of Trade may at any time after the expiration of two years from the completion of the works of the Gaslight and Coke Company at Beckton, near Barking, give notice to the united company that they require them to cease altogether the manufacture of gas in the City of London, and at any time after the expiration of five years from the completion of such works the Board of Trade may give notice to the united company that they require them to cease the storeage of gas in the City of London, and after the expiration of six months from the date of any such notice, or of such longer period as may be specified therein, it shall not be lawful for the united company to manufacture gas in the City of London, if such notice be given with respect to such manufacture, nor to store gas in the City of London, if such notice be given with respect to such storeage, unless the Board of Trade see fit to extend the time during which such manufacture or storeage is to continue: Provided always, that nothing in this scheme shall be deemed to prejudice, diminish, or affect the rights, if any, of the City of London Gaslight and Coke Company, or the united company, to compensation for injury done to the property of the City of London Gaslight and Coke Company at Blackfriars, and for the interference with the carrying on of the business of that company.

Application of Compensation receivable by the Amalgamating Companies, or by the United Company.

33. Any compensation which may become payable to either of the amalgamating companies, or the united company, in respect of interference with or damage to the works, property, or undertaking of either of the amalgamating companies, or of the united company, shall be applied in the same manner as the proceeds of sales are directed to be applied in the thirty-first section of this scheme: Provided, that this section shall not apply to such money, if any, as may become payable annually to the City of London Gaslight and Coke Company, or to the united company, in respect of the increased cost of the delivery of coal or coke or other material to or by the said gas company, which money shall be carried to revenue account.

Limits of United Company.

34. After the commencement of this scheme the district within which gas is to be supplied by the united company shall include and be co-extensive with the districts of the amalgamating companies respectively as defined by the Metropolis Gas Act, 1860.

Interpretation of Scheme.

35. If any question arises as to the interpretation of this scheme, whether in connexion with the said Acts relating to or affecting the amalgamating companies or otherwise, the same may be referred to the Board of Trade for their decision, and the decision of the Board of Trade thereon shall be final.

United Company to pay Expenses of Amalgamation.

36. The united company shall pay all the expenses of and incidental to the closing of the accounts of the amalgamating companies respectively, and of and incidental to their amalgamation.

RATCLIFF GASLIGHT AND COKE COMPANY.

The Half-Yearly General Meeting of the Shareholders of this Company was held at the Offices, Cable Street, St. George's-in-the-East, on Monday, Feb. 28—A. WILSON, Esq., in the chair.

The SECRETARY read the notice convening the meeting, and the following report of the directors:—

The directors have much pleasure in submitting their report and accounts for the half year ended Dec. 31, 1869.

Notices having been served on behalf of St. George's Vestry and the Board of Works for the Limehouse District, requiring the company to take down the house adjoining the entrance to the works, and to set back the line of frontage and boundary wall of their premises, on the north side of New Crane, Shadwell, negotiations for the sale of the necessary land, &c., were concluded in August last, and a net sum of £1909 17s. 11d. has been received and credited in the capital account under the head of "New Crane Improvement."

The alterations at the manufacturing station, which were referred to in the last report, have been so far completed, under the supervision of their consulting engineer, Mr. Robert Jones, who has specially undertaken for a limited period to carry on the manufacture and distribution of gas, since the resignation of their late engineer in September last, as to justify the directors in reducing the price of gas to consumers by meter within the company's district from April next. It is believed that this result will be equally approved by the shareholders and consumers of gas.

Out of the available balance of profits, the directors recommend that a dividend upon the paid-up capital of the company, after the rate of 5 per cent., for the half year ended Dec. 31, 1869 (less income-tax), be now declared, payable on and after the 11th day of April next.

The retiring directors, Henry Baddeley, Thomas Morrison Fairclough, and Henry Laurence Hammack, Esqs., being eligible, offer themselves for re-election.

The shareholders will also have to elect an auditor in the place of the late Charles Thomas Taylor, Esq., deceased, whose investigation of the company's accounts had extended over a period of fifteen years.

In conclusion, the directors beg to assure the shareholders that they will continue to give their best attention to the interests of the company.

Dr. Trade Account, for the Six Months ended December 31, 1869. Cr.

To Directors allowances	£400	0	0	By Gas-rental	£14,810	10	10
Salary of secretary and clerks	527	10	0	Less bad debts and allowances	97	4	7
Collectors commission and pay	130	16	0		14,713	6	3
Rent, rates, and taxes of offices	33	19	7	Public lighting and under contracts	2,053	1	2
Stationery, printing, and general charges	171	8	3	Rental of meters	3	12	2
Payment to auditors	7	17	6	Sale of old materials	11	5	0
Coals, including carriage, dues, &c.	6,885	9	3	Coke	2,928	11	4
Purifying materials	151	11	8	Breeze	55	17	6
Supervision and labour	3,564	16	4	Tar	531	15	8
Tools and other implements	162	9	7	Ammoniacal liquid	338	5	11
Ordinary repair and maintenance of premises	5,185	12	9	Miscellaneous receipts	92	11	9
Rents, rates, and taxes of manufactory	545	2	4				
Distribution—ordinary repair and maintenance	93	15	6				
Meters — restoring and replacing	17	4	0				
Leaseholds Redemption Fund	110	0	0				
Interests on borrowed capital	391	15	0				
Net profit	2,348	19	0				
	£20,728	6	9		£20,728	6	9

The CHAIRMAN: Gentlemen, it is very gratifying to your directors to be in a position to present so favourable a report of the result of the last half year's working. I think on no former occasion—certainly not since I have been a director—have we had so much cause to congratulate ourselves upon the condition and prospects of our affairs. The report informs you that we have had to set back our boundary wall in Wapping High Street to a distance of about 11 feet. We had no option in the matter, the Act of Parliament giving the vestry power to take so much property as is necessary for public improvements, on paying a fair compensation to the owners for the same. Our area was already very limited, so that we could ill afford to lose a portion of our ground; but we have received a *quid pro quo*, and the result is that a great improvement has been effected in a public thoroughfare, if not in the gas-works. Last time I had the pleasure to address you I told you that we were carrying out some large improvements in our manufacturing plant. Those improvements were then not quite complete, but I am happy to say they are so now, and we are thus placed in such a position that if the Legislature should desire us to come under similar provisions to those of the Gas Act of 1868, I believe we should be able to comply with all those requirements. The works have been completed under the advice of our consulting engineer, and it is very satisfactory to know that we are supplying gas from them of a higher illuminating power, and in every other respect perfectly in accordance with the Statute. You will, I am sure, be pleased to hear that we are about to reduce the price of gas to our consumers, from 4s. 6d. to 4s. per 1000 cubic feet. We have been striving at this ever since I have been a director, and to my mind it is very gratifying that we are now able to supply gas at the same price as neighbouring companies, in consequence of the outlay we have made in improving the works. We believe, too, that under the careful supervision of our engineer, we shall be able to confer this benefit upon the public, and still continue to pay you your 10 per cent. I now move—"That the report and accounts now read be received, adopted, and entered upon the minutes."

The DEPUTY-CHAIRMAN (Mr. Bromley) seconded the motion, which was put and carried unanimously.

The CHAIRMAN moved—"That a dividend for the half year ended Dec. 31, 1869, upon the paid-up capital of the company, after the rate of 5 per cent. (less income-tax), be now declared, payable on and after the 11th day of April next."

Mr. BROMLEY seconded the motion, which was carried unanimously.

The retiring directors, Messrs. Baddeley, Fairclough, and Hammack, were severally re-elected; and Mr. John Sander was elected an auditor, in the room of Mr. Taylor, deceased.

A cordial vote of thanks was given to the directors for the able manner in which they had conducted the affairs of the company, which the CHAIRMAN briefly and appropriately acknowledged.

Mr. BACKLER moved a vote of thanks to the secretary. It was, he said, from his knowledge of Mr. Baddeley that he was induced to become a shareholder in the company, and he was much gratified in observing the manner in which the duties of the office were discharged. He congratulated the directors on the successful working of the company, and expressed a confident opinion that with the improvement which had taken place, and with a continuance of the same careful management of affairs, there was very little risk of a diminution of dividend from the reduction in the price of gas.

Mr. NUTTER seconded the resolution, and said the accounts of the company were most ably kept.

The motion was unanimously adopted.

The SECRETARY thanked the meeting for this renewed compliment, and said that so long as he enjoyed the confidence of the shareholders generally, as he did of the directors, his best endeavours would always be put forth to advance in every possible way the interests of the company.

OFFICIAL REPORT OF PROFESSOR CHANDLER TO THE NEW YORK BOARD OF HEALTH ON THE METHOD OF PURIFICATION EMPLOYED BY THE GAS COMPANIES.

The following is the official report of Professor Chandler to the Metropolitan Board of Health on the subject of the manufacture and purification of illuminating gas, and, embracing as it does the methods of avoiding nuisance, as well as the stand taken to secure a better quality of gas, and at the same time obviate the evils to which the public has been subjected, it will be found of particular interest:—

Sir,—In answer to the resolution of the Board of Health, directing the chemist to make a statement *in extenso* of the methods of purification employed by the several gas companies of New York, I have the honour to submit the following report:—

I.—METHODS OF PURIFICATION IN GENERAL USE.

The crude gas which is produced by the exposure of bituminous coal to a bright red heat, in clay or iron retorts, is freed, during its passage through the hydraulic main, the condenser, and the washer, from the tar which it contains, and from a portion of its water and ammoniacal compounds. It still contains, however, objectionable impurities, which must be removed by a process of purification. These are sulphuretted hydrogen, sulphide of ammonium, cyanide of ammonium, sulphocyanide of ammonium, bisulphide of carbon, certain other sulphur compounds whose exact nature is not known, and carbonic acid. The sulphur compounds are all very objectionable; they give the gas a very offensive smell, and, when burned, produce sulphurous acid, which, if produced in any considerable quantity, would quickly render the air of a room unfit for human life, and seriously injure furniture and goods exposed to its action. These sulphur compounds must therefore be removed. The carbonic acid gas is objectionable only in as far as it diminishes the illuminating power of the gas when present in appreciable quantities. There is no sanitary objection to carbonic acid, for perfectly purified gas would produce, when burned, a great many times as much carbonic acid as exists in the most impure crude gas. The presence of ammonia in gas in appreciable quantities is objectionable; but, as all the methods of purification at present used remove the compounds of ammonia very effectually, we may confine the discussion to the sulphur compounds and the carbonic acid. There are four methods of purifying gas now in use.

1. The Wet Lime Process.

This process involves passing the gas through milk of lime. It is the oldest process in use, and is very effective in removing both the sulphur compounds and the carbonic acid. It has been generally abandoned, however, on account of the difficulty of disposing of the foul milk of lime, called "blue billy." Occurring as a liquid, the blue billy is not easily transported, and, as it does not rapidly undergo oxidation, it is not well adapted for use as a fertilizer. Running it into rivers and streams has been forbidden by law, as the pollution of the waters by it was intolerable, while the extremely offensive smell which it emits makes it impossible to store it until it becomes dry enough for transportation.

2. The Dry Lime Process.

In this process dry or slightly moist hydrate of lime is placed on trays or iron boxes, through which the gas is made to pass. This process is very effective, and has very generally superseded the wet lime process. It removes the sulphur compounds and the carbonic acid equally well. When the foul lime is removed, however, it evolves the same odour which caused the wet lime process to be abandoned. When exposed to the air it rapidly undergoes oxidation, becoming heated in consequence. During this process it evolves sulphide of ammonium and some other compounds whose exact nature is not known, but whose odour is extremely offensive. This is the cause of the "gas nuisance" so loudly complained of a few years ago, when all the New York companies employed this process of purification. After the oxidation of the foul lime is completed it ceases to be specially offensive, the peculiar stench being evolved during the first hour or two of exposure. The offensiveness of this foul lime became such a constant cause of complaint in the large cities of Europe, that the gas companies were compelled to abandon the process, as they had previously abandoned the wet lime. A system of ventilating the foul lime has been invented, and is now in use at both the stations of the Manhattan Company in this city, which effects its oxidation in such a manner that the offensive gases evolved are not permitted to escape into the atmosphere, but are passed through a washing apparatus, and finally through a special purifier, by which they are rendered comparatively inoffensive. This invention seems to obviate the nuisance of dry lime purification.

3. The Laming Process.

In 1849 Mr. Laming introduced the hydrated sesquioxide of iron as a substitute for lime for purifying gas, preparing it of a suitable quality by mixing copperas (sulphate of iron) with slaked lime and sawdust, and exposing the mixture to the air to oxidize the protoxide of iron to the sesquioxide. The resulting mixture contains hydrated sesquioxide of iron, sulphate of lime, sawdust.

When an excess of hydrate of lime is employed, the resulting mixture contains this substance also. This material is very effective in removing the sulphur compounds from the gas. There is, however, some difference of opinion as to the completeness with which the carbonic acid is removed, due perhaps to variations in the proportions of the ingredients. Two important advantages attend the use of this mixture—first, when fouled it does not evolve offensive odours on exposure to the air; second, by exposure to air the sesquioxide of iron, which has been changed to sulphide of iron in the purifier, is regenerated, the sulphur being liberated, and sesquioxide of iron again formed. The mixture may, therefore, be used again and again till it becomes so clogged with the sulphur liberated that it does not act promptly on the gas. It is then found to contain from 40 to 60 per cent. of sulphur, and may be used for the manufacture of sulphuric acid. I have seen mixtures which had been in use twelve months.

4. The Iron Ore Process.

A few months after Laming introduced the artificial hydrated sesquioxide of iron in France, Mr. F. C. Hills applied the natural hydrated sesquioxide of iron, or "bog iron ore," in England. This material, like the Laming mixture, may be used again and again, and does not evolve offensive odours when exposed to the air. A modification of this process is now used by the New York Gaslight Company of this city. It was invented by Messrs. St. John and Cartwright, and has been in use nearly two years, giving entire satisfaction. As the bog iron ores of this neighbourhood are not sufficiently pulverulent to act promptly on the gas, Messrs. St. John and Cartwright add to the ore a quantity of iron borings or turnings, which they then convert into an artificial hydrated sesquioxide of iron by moistening the whole with ammoniacal liquor and exposing it to the air. The resulting mixture of natural and artificial oxide receives an addition of coarsely pulverized charcoal. This mixture is always sprinkled with ammoniacal water before it is placed in the purifier.

The material now in daily use at the works of the New York Gaslight Company was introduced in April, 1868. Occasional additions of iron borings have been made to it, otherwise the material is the same. When last tested it contained 30 per cent. of sulphur. In Germany several varieties of sesquioxide of iron are now in use, prominent among which are the "Oberuseler mixture," an

iron ore containing some oxide of manganese; the "Manheim oxide," and "Deicke's oxide," very pure artificial oxides of iron.

II.—EXTENT TO WHICH THE DIFFERENT METHODS OF PURIFICATION ARE EMPLOYED.

The wet lime method has been almost entirely abandoned. The only works at which I know it to be used at present are at Cork, in Ireland. These works are of moderate size, and are situated out of the city. Moreover, the gas is freed from ammonia by means of sulphuric acid before it comes in contact with the lime. The foul lime does not, therefore, evolve sulphide of ammonium when exposed to the air. The dry lime process, though still in general use in this country, has been almost universally abandoned in Europe—abandoned, firstly, because the foul lime was an intolerable nuisance; secondly, because the process is too expensive, as the lime can be used but once, and when exhausted has but a trifling value as a fertilizer.

The Laming mixture is now used in many European gas-works. All the gas supplied to Paris is purified by this material. The German gas engineers have found that this mixture owes its efficacy entirely to the oxide of iron which it contains, and that the sulphate and hydrate of lime present do not take any appreciable part in the purification. Hence they are abandoning this mixture for the natural or artificial oxides of iron, which are cheaper and more efficient.

The iron ore method is now most generally used in Europe, and has obtained a foothold in this country, being used by the New York Gaslight Company, in this city, as already described, and by two or three companies in Massachusetts. All the Liverpool gas, much, if not all, of the London gas, and that of most of the German cities, is now purified either by iron ore or one of the artificial oxides of iron. As my statements with regard to the general use of iron in place of lime were called in question during the hearing before the Board of Health, I will state that they were fully confirmed by my observations in Europe during the past summer, and will quote two or three unimpeachable authorities. Dr. Schilling, director of the gas-works at Munich, and editor of the *Journal für Gasbeleuchtung*, says on page 247 of that journal for 1868, "Iron purification is now in general use." Mr. A. Buhe, who was one of the chemists employed by the German Gas Association to investigate the whole subject of gas purification, says in the above-mentioned journal for 1868, page 327 *et seq.*: "Gas engineers have sought by various means, especially by lime, to remove the carbonic acid from gas; but these have been generally abandoned on account of the cost and the numerous disadvantages which attend their use. . . . Purification by lime is hardly in use at the present time." Mr G. R. Hislop, engineer and manager of the Paisley Gas-Works, and president of the North British Association of Gas Managers, stated in his address at Glasgow, July 28, 1869: "Purification by lime in London and elsewhere has now become inadmissible; in such places oxide of iron is employed as the purifying agent." (JOURNAL OF GAS LIGHTING, 1869, p. 695.)

III.—COMPARATIVE ADVANTAGES OF THE DIFFERENT METHODS.

The lime methods effectually remove the carbonic acid, and reduce the sulphur compounds to a minimum. Were there no objections to the use of dry lime on the score of cost or offensiveness, I think this agent would be generally preferred. Lime was first abandoned on account of the nuisance which it occasioned, but the iron oxides are now actually preferred by the European gas engineers on account of its greater economy. Mr. King, the engineer of the Liverpool works, assured me that the oxide of iron purification, which he had used exclusively for the past seven or eight years, cost less than half as much as the dry lime process used previously.

Two objections are urged against the iron methods by those who are prejudiced in favour of lime—first, they do not remove carbonic acid; second, it is claimed that they do not remove the sulphur compounds so completely as lime.

The first is generally conceded to be true. But the only objection to carbonic acid is that it reduces the illuminating power of the gas; 1 per cent. of carbonic acid diminishes the illuminating power 5 per cent. The average quantity of carbonic acid is, say, 2½ per cent., then the illuminating power of the gas will suffer to the extent of 12½ per cent., or one-eighth.

There are two ways in which this difficulty can be effectually met—first, by using better coals for making the gas, or adding a few pounds of rich cannel or some other enriching material to the ordinary gas coals; or, secondly, by taking less gas from the coal. The last gas drawn from the coal is always inferior to that which comes off first. Mr. A. Buhe, already referred to, says: "It has become more and more the custom to leave the carbonic acid in the gas, and to neutralize its bad influence on the illuminating power by taking less gas from the coal, thus getting a better gas." Dr. Schilling says: "Carbonic acid is of no consequence to the consumer; cannel coal is the remedy."

The second objection to the iron processes is the alleged imperfect removal of the sulphur compounds. None of the methods in use entirely remove the sulphur from the gas. The question arises, therefore, how much sulphur can be safely left in the gas? The English Parliament has answered this question by fixing the limit at 20 grains of sulphur to 100 cubic feet of gas; and, to see that the companies come within this limit, chemists are appointed, whose duty it is to analyze the gas and to report its quality. I have before me the report of Dr. Letheby for the months of January, February, and March, 1869. He states the grains of sulphur found in 100 cubic feet of gas to be as follows:—

	Maximum.	Minimum.	Average.
City of London Gaslight and Coke Company	18·92	11·70	15·00
Gaslight and Coke Company . .	24·15	15·75	19·49
Great Central Gas Consumers Company	24·00	7·03	12·28

From this it will be seen that the gas of London, although purified by iron, does not average 20 grains of sulphur in 100 cubic feet. With regard to the Paris gas, which is purified by Laming's oxide of iron mixture, Professor J. Lawrence Smith, one of the United States Commissioners to the French Exposition of 1867, who is the president of the Louisville Gas Company, has given us a very decided opinion. On page 88 of his report, which was published by the United States Government, he says: "The gas of these works is most thoroughly purified, and the dealers in silks and other delicate fabrics, who, a few years ago, always suffered more or less loss from the results of the combustion of impure gas acting on their fabrics, now no longer suffer from this cause."

Dr. Letheby (JOURNAL OF GAS LIGHTING, 1869, p. 83) has argued that 20 grains of sulphur should not be left in the gas, and proposes, therefore, as the most effective method of purifying gas this treatment—first, with ammoniacal liquor; second, with hydrated oxide of iron; third, with dry lime. As the iron will have removed the sulphuretted hydrogen, the refuse lime will not be offensive, while it will effectually remove the carbonic acid. This system of purification will, he thinks, reduce the quantity of sulphur to 10 or 12 grains per 100 cubic feet. Most gas engineers and chemists differ from Dr. Letheby on this point, however. Dr. Schilling says, in his *Journal für Gasbeleuchtung* for 1869, p. 484: "Twenty grains of sulphur in 100 cubic fect of gas are entirely unobjectionable. Under the most favourable circumstances, with no ventilation whatever, it would give the atmosphere of a room only one part of sulphurous acid in 500,000 parts of air." Professor William Odling, secretary of the London Chemical Society, has spoken very clearly on this subject in his lecture to the British Association of Gas Managers, June 2, 1868, which appears in the JOURNAL OF GAS LIGHTING, for 1869, p. 81, and I have found that his views are those generally entertained by chemists and gas engineers. He said:

I am altogether at issue with the public when they maintain that the sulphur of gas produces, by its combustion, oil of vitriol, or that the amount of sulphur ordinarily contained in gas is of any consequence whatever, and a little consideration will, I think, satisfy you of the soundness of this position. We will assume that coal gas contains not 20, but 40 grains of sulphur in 100 feet—a quantity, at any rate, greatly exceeding the reality. Now, making another extravagant assumption, that the whole of these 40 grains of sulphur would be completely burned—and, in reality, they would be burned very incompletely—they would furnish, by their combustion, 80 grains of sulphurous acid gas. This quantity of the produced sulphurous acid would occupy at ordinary temperatures about 1-15th part of a cubic foot; and since 100 cubic feet of our coal gas gives 1-15th of a cubic foot of sulphurous acid, 1500 cubic feet of coal gas would be required to furnish 1 cubic foot of the acid, even upon the extravagant assumptions we have purposely made. But the combustion of 1500 feet of coal gas would produce something besides sulphurous acid. It would produce at least 1000 cubic feet of carbonic acid, and, in addition to its dilution by other gases and vapours, we should have our sulphurous acid diluted by 1000 times its volume of carbonic acid. Now, if we can get at the proportion of carbonic acid in the atmosphere of a room highly illuminated with gas, and take the thousandth part of that proportion, we shall be able to form some notion of the amount of sulphurous acid present. You will remember that the amount of carbonic acid furnished by the breath of one individual is equal to that furnished by two 3-feet gas-burners, and that the maximum amount of carbonic acid found in the atmosphere of a crowded theatre was 0·32 per cent. Now, if in addition to our previous unreasonable suppositions, we further suppose that an atmosphere contains 0·2 per cent. of carbonic acid furnished by gas combustion, you will see that the whole matter becomes a *reductio ad absurdum*—that we might actually have one half-millionth part of sulphurous acid present in the air of a gas-lighted room.

I think that the facts and opinions here quoted effectually dispose of the second objection to oxide of iron purification. It may seem that I have said more than was necessary on the comparative merits of the lime and iron processes of purification, but a perusal of the testimony given during the hearing before the board will recall the fact that the evidence of the experts called by the Metropolitan Gaslight Company was almost entirely confined to this question. In fact, the only defence offered was the alleged total failure of the iron processes, and the consequent unavoidable use of lime.

IV.—HISTORY OF THE GAS NUISANCE.

For years the citizens of New York have complained of a peculiarly offensive smell which was perceived throughout the city to a greater or less degree, according to the weather. This smell was noticed at particular hours of the day, and pervaded large districts, making it impossible to open the windows during its prevalence. By many this smell was attributed to the gases from the sewers, but it was easily demonstrated that the sewers did not, as they do not now, send out offensive gases. The enormous quantities of Croton water used throughout the city make it impossible for the sewers ever to become specially offensive. The smell was peculiar, and was recognized at once by every chemist, and by every one familiar with the manufacture of gas, as the smell of the foul lime which had been used for purifying gas.

The first special complaint against a gas company that I find on record is that of Dr. E. H. Jones, to the Board of Health, against the Manhattan Company, dated April 24, 1866, and printed in the annual report of the board for that year. The subject was at that time referred to the Sanitary Committee. On the 30th of April following a committee of the Citizens Association conferred with the Sanitary Committee on the subject; Professor R. O. Doremus and Professor Samuel St. John appearing as members of the citizens committee, and the gas companies being represented by some of their officers. As a result of this conference, the Manhattan and New York Companies at once turned their attention to the subject, and sought means to prevent the nuisance which they admitted to exist. Nor were their efforts in vain. The Manhattan Company made a number of experiments with a view to destroying the foul gases of the refuse lime, and finally introduced the ventilating process which I have already alluded to, and which, with the improvements recently introduced, seems to effectually remedy the nuisance. The New York Company was equally active, and after considerable investigation decided to give up lime purification altogether, and very judiciously introduced the oxide of iron in its place. Thus the largest companies on the island, which supply all the gas consumed below Thirty-fourth Street, promptly responded to the suggestions of the Sanitary Committee, and removed the cause of complaint. As these two companies manufacture four-fifths of all the gas produced on the island, and own all the gas-works situated below Forty-first Street, a great improvement was at once noticed.

The Metropolitan Company, however, which supplies gas to that portion of the city between Thirty-fourth and Seventy-ninth Streets, paid no heed to complaints of the citizens, but continued to send out the odours of foul lime. As this company does not manufacture more than one-fifth of the gas supplied to this city, the nuisance was not, however, so general as before. Its works are situated at the foot of West Forty-second Street, and the odours are often blown westward, away from the island. In certain kinds of weather, however, the smell was diffused throughout the city, and complaints were not rare. Some attempts were made to coerce the company, but all responsibility for the smell was stoutly denied by the officers. The members of the Board of Health were on the alert with a determination to compel the offending parties to follow the example of the other companies.

On July 5, 1868, Dr. Stephen Smith, sanitary commissioner, and Dr. Elisha Harris, sanitary superintendent, noticed the unmistakeable smell of foul lime in Thirty-fourth Street. They consulted the neighbouring vanes, and found that the wind was blowing from the north-west; and walking in this direction, guided by the odour, they came to the Metropolitan Gas-Works, in West Forty-second Street, when they found that a purifier had just been emptied, and the pile of foul lime was still warm and reeking with offensive gases. When these facts were reported to the Board of Health an order was at once issued, dated July 14, declaring the manufacture of gas at the foot of West Forty-second Street to be a nuisance, and ordering the same to be discontinued, except it be conducted by a process that will not allow any deleterious gases or odours detrimental to health to escape into the external air.

Mr. Zollikoffer, the president of the Metropolitan Company, at once requested an opportunity to be heard in defence of the company; and on August 10 he appeared by counsel, and showed by his witness that he employed the best coals and purified by the best process, and that the gases evolved by the foul lime were anything but unhealthy—were, indeed, a specific for the whooping-cough and other diseases. The attorney for the Board of Health showed by his witness that the purification as conducted by the Metropolitan Company was necessarily a nuisance, but one that could easily be avoided by following the example of either of the other city companies. The hearing was then adjourned to August 13. On that day the counsel presented a memorial from the gas company, signed by the president. In this they first plead the inexperience of youth, the company being the youngest on the island. They then state that they never heard it even suggested that purification by dry lime was in any way offensive till they received the order of July 14. This is a somewhat remarkable statement, inasmuch as every book on gas-making admits the nuisance, and since the other companies had two years previously, in response to the Board of Health, investigated the matter, and made the necessary changes, all the particulars having appeared in the daily papers from time to time.

Further, while they protest against the adjudication of the Board of Health that their process of purification is a nuisance, they avow their willingness to try any method which science may suggest and experiment demonstrate to be a better one than that which they are using; and finally request that the hearing be postponed till March 1, 1869, that they may experiment on improved methods of purification. The board finally consented to a postponement of several months.

On Feb. 6, 1869, the hearing was resumed. The gas company had enjoyed a respite of nearly six months for this special object, and on a distinct written pro-

mise of making experiments, and had not actually made a single experiment during the entire period. One thing only had been done—they sent a man to Europe to learn what processes of purification were in use there. He had returned, but great care was taken, when the hearing was resumed, not to put him on the witness-stand, for his written report was a complete confirmation of all that had been claimed by the witness for the Board of Health with regard to the improved processes of purification there, and for preventing nuisance. What did the Metropolitan Company do then, after making written promises and saying so much about good faith, &c.? They made no experiments; did not follow the advice of the man they had sent to Europe, did not do what either of the other New York companies had done to mitigate the nuisance; but at the end of six months appeared by counsel, with distinguished chemical experts, to defend the stench-producing method of purification. For several days the hearing was continued, and nearly 200 printed pages of testimony taken.

I will do justice to Professor Silliman, who was called to testify by the gas company, by stating that while we differed as to the expediency of introducing iron purification instead of lime, he stated clearly and unequivocally, on the cross-examination, that the process of purification as conducted by the Metropolitan Company was necessarily a nuisance, and that by using simple precautions this nuisance could be avoided. This was all that the Board of Health was called upon to prove, and the admission of this by their own witness was evidently understood by the gas company as equivalent to losing their case; so they presented another memorial, or rather a set of resolutions, in which they again proposed to experiment. This was on March 4, and the hearing was then postponed till March 22, the company solemnly stipulating to introduce and test the iron or some other improved process.

When March 22 arrived the company again made excuses. "In order to introduce the iron process it was necessary to place false bottoms of perforated plank in the purifiers, and there was only one man in New York who could bore the holes, and he had been busy boring holes for some one else." Still the patience of the Board of Health held out, especially as a prompt enforcement of the order of July 14 might have thrown into darkness all that portion of the city lying between Thirty-fourth and Seventy-ninth Streets. Finally the gas company actually began to experiment, but in a very original way. They engaged a man to make a soap with which to wash the smell out of the foul lime. A considerable quantity of it was used, and the members of the Board of Health and several other gentlemen were invited to witness the success of the operation. But the soap did not answer; it was tolerably effective on the upper layer of foul lime, but left the lower five or six layers as offensive as ever. At last an iron mixture was procured; not one of those, however, which the messenger to Europe had seen in successful operation, and minutely described in his written report, nor yet the one in use by the New York Gaslight Company, but a mixture which was once used somewhere in New Jersey, and subsequently abandoned—a mixture of Spanish brown, shell lime, and sawdust. Half the purifiers were filled with this mixture, while the other set was filled with lime as usual. They went through the motions of using this mixture in half the purifiers during most of the past summer, though the gas was actually purified, I think, by the purifiers containing lime. At all events the mixture did not work as might have been expected, and this autumn, as soon as the consumption of gas increased, the mixture was thrown out, and the purifiers were again filled with lime. So this company has now gone back to the old process, and, in spite of all the evidence to the contrary, and all the time and money expended in bringing out that evidence, it still stubbornly denies the fact that foul lime creates a nuisance, or that any improvements have been made in gas purification.

The offensive process is now in full operation, and, more than that, the foul lime is actually used to fill in a pier. This is specially objectionable, as it has already happened, both in London and Dublin, that on making excavations for sewers in places where foul lime has been used for filling in, the workmen were killed by the gases evolved. Five men were killed at one time in this manner in London in 1849.

Such is the history of the gas nuisance in New York, brought down to date.

V.—WHAT THE METROPOLITAN GAS COMPANY MIGHT DO.

This company has probably spent nearly 10,000 dols. for expert fees, counsel fees, sending to Europe the man whose evidence was suppressed and whose advice was not followed, time of *employés*, printing 200 pages of evidence, &c., all apparently with the design, not of suppressing the nuisance, but of defeating the honest efforts of the Board of Health in behalf of the citizens of New York. Suppose the officers of this company were really acting in good faith, with a sincere desire to obviate the nuisance, they could at once introduce a better process of purification, a cheaper process, by which they could save 10,000 dols. per annum, or they could retain their present process and ventilate the foul lime. Let them follow the example of either of the neighbouring companies, use the iron process of the New York Company, or the ventilating process of the Manhattan Company, or they may select any one of the improved iron processes now used in Europe. All that is asked of them is, that they manifest the same willingness to direct their efforts to the management of their business in a manner most conducive to the health and comfort of the city, as was so promptly manifested by the other companies.

VI.—CHANGES REQUIRED.

The introduction of an iron process would require little, if any, change in the apparatus. Some iron mixtures are employed in exactly the same iron boxes, with trays, as the company are now using for lime, while the greatest change that could be necessary would consist simply in taking out the moveable trays and introducing a flooring of plank, perforated with auger holes. A few hours would suffice to make the change; in fact, the plank flooring is already on the ground. A few days would be required to procure the necessary material. As there are two sets of purifiers, either of which could, in case of necessity, be made to purify all the gas made by the company, the change could easily be made without any serious interruption. Until within a short time the New York Gas Company has been obliged to purify more gas than the Metropolitan Company now makes with purifiers of no greater capacity than one of these two sets. To introduce the ventilating process considerable additions would be required to the apparatus. A suitable engine, a blower, a washer, and a supplementary purifier for the air used in ventilating would be required, besides a considerable length of mains and the necessary connexions. These additions would involve an outlay of several thousand dollars, and some months would be consumed in procuring and erecting them.

VII.—THE AMMONIA WORKS IN EIGHTEENTH STREET.

I cannot consider this report completed until I have referred to the peculiar odour which is evolved in West Eighteenth Street, and which is attributed by many to the Manhattan Gas-Works. I refer to the odours which escape from the Ammonia Works in that street. The ammoniacal liquor of the Manhattan works is sold to parties who manufacture from it ammoniacal salts. This liquor contains sulphide, cyanide, and sulphocyanide of ammonium, carbonate of ammonia, and various other compounds which are offensive, but whose exact nature is not known. With careful management the treatment of this liquor need not cause offence, but it is so conducted at these works as to send forth a very disagreeable odour, which is mistaken by persons not familiar with the business for the odour of foul lime. I have noticed this odour, at some distance from the works, almost every time I have visited the neighbourhood. The proprietors of the works should be induced to modify their process in such a way as to prevent this nuisance.

SPECIMENS.

In conclusion, I beg leave to submit a few specimens of the iron ore and oxide of iron mixtures, which I collected in Europe this summer, and which are now in actual use in Liverpool, London, Paris, &c.—Respectfully yours,

C. F. CHANDLER, Ph.D.,
Chemist to the Metropolitan Board of Health.

Colonel Emmons Clark,
Secretary of the Metropolitan Board of Health.

SUFFOCATION OF A FAMILY BY GAS LIQUOR ON BOARD A SLOOP AT HULL.

On Thursday, March 3, an inquest was held in the County Court Room, Hull, before the borough coroner, J. J. Thorney, Esq., on the bodies of Thomas Booth, aged 28, captain of the sloop *Sarah*, of Goole, lying in the river at Hull; Mary Booth, his wife, aged 26; and their three children, Susannah, Mary Ann, and Elizabeth, respectively one, three, and five years of age, whose deaths were occasioned under the circumstances deposed to.

The CORONER said he had been informed that Thomas Booth was the master of a vessel trading between the Alum Works, Goole, to which it belonged, and some gas-works in the neighbourhood, for the purpose of collecting ammoniacal liquor, for which purpose the vessel was fitted. Last night, while the master was on deck superintending the filling of the vessel, his wife, who was in the cabin with her three children—Susannah, Mary Ann, and Elizabeth—ran on deck and told him that the smell of the liquor had made its way into the cabin, and that one of the children was suffocating. He descended, and shortly after returned. His wife came up again, and called out that the eldest girl was dead. Mr. Booth went down, and the mate shortly after called to him, and not receiving an answer, he went down and found all five dead. It would be for them to inquire if they were killed by the ammoniacal gas, whether any person or persons were to blame, and to ascertain if any means could be adopted to prevent such mortality in the future.

Joseph Allen, mate of the sloop *Sarah*, identified the bodies, and said the captain and his family had lived on board the vessel, which belonged to Mr. Meek, of Goole, who was foreman of the alum works. Had not been on board the vessel before yesterday afternoon. She was fitted with four tanks, which completely filled the hold. They were got at by means of holes—one to each tank—and stood a little above the deck. The tops of the tanks were made of wood. Got to the gas-works about half-past five. There was some liquor named gas water in the tanks at the time, which he had helped to take on board. It was taken on board yesterday, and some the day previous. Had no reason to think that there were holes in the tanks then, but thought there were now. Slept on board the vessel on Tuesday night. Did not experience any annoyance in smell. The openings in the tanks were closed up with bungs before they left Soulcoates. Did not know how many tanks they took in. Filled the tanks by means of a gutta-percha pipe. Gave the orders to the engineer of the gas-works, and returned on board. Booth was on deck, and his wife and children in the cabin. That was about six o'clock. The liquor commenced to run five minutes after the order was given. None of it was spilt. Filled the tank in three quarters of an hour, and then commenced to fill another tank. Filled the middle tank, and three barrels. After the hose was shifted, witness went to the gas-works and told them to go on. The gas water commenced to run as soon as he got back again. About five minutes after he got back the mistress sung out the child was in a fit—the eldest girl. She did not come on deck, but just put her head up in the hatchway. Booth took some cold water and went down below. Stopped below two minutes, and then came on deck. Told me to go to the works and stop the engine when the tank was nearly full. Was saying this when Mrs. Booth called out the eldest girl was dead. Booth went below into the cabin, and witness remained on deck watching the tank for five minutes after. One of the gas people came up and gave him the notes of the cargo, telling him to take them to the captain. Took the notes to the hatchway, and told the captain there were some notes for him, but he did not answer. All was still below. Could see into the cabin, and saw a candle lighted. Went down to see, and saw the mistress sitting on the locker, leaning back, and Booth lying on the locker, with his head on Mrs. Booth's breast. The three children were lying on the floor—two with their faces on the floor, and the youngest of all across them. Went to a man named William Booth, who was working on a vessel ahead. He went back with witness, and they found them all dead. As soon as witness and the man found they were dead, they went to the gas-works to tell them to stop the liquor and give them some assistance. Got some assistance, and came back. Witness went below, and there was a very strong smell like the gas smell. Fastened a rope to Booth's arms, and the men pulled him up. Was nearly overpowered by the smell. After getting a little revived, went down and fastened a rope round the mistress. Got the bed-clothes on deck to cover them with, and one of the gas men got the children out after. They were all quite dead. Pumped the water out before putting the liquor into the fore tank. The fore tank was not full before they stopped the engine; it could not run over. Knew that the tank leaked this morning, because he had heard it running down the side of the starboard fore tank. Pumped the vessel out between eight and nine o'clock, after he had heard it running, and the water smelled strongly of the gas water. It was nothing like the water pumped out before. There was no difficulty in changing the pipe. Could stand straight up in the cabin. There was a ladder leading into the cabin. The children were quite well during the day. Saw them all right between four and five o'clock. There was always a smell in the cabin, but not so bad as when witness went into the cabin after.

Mr. *Charles Copland* said he was engineer and superintendent to the British Gas-Works Company. The ammoniacal liquor was a preparation obtained from the gas tar by distillation. It was ammonia in solution and in combination with many other gases. It fell into underground wells in connexion with the tar, and was separated from the tar by its specific gravity. Was used very largely for chemical purposes. Had a contract with the Alum Company for the removal of their annual yield of gas liquor. The vessel was fitted up for the purpose, and had been so used for ten years. Booth began to work about the latter part of February. Had some conversation with Booth. Was finding fault with him for his delay in coming for the liquor. Believed the tanks were made of wood. Wood tanks in good condition were quite sufficient. The liquor had a violent action on iron, corroding it soon. The liquor was no stronger for smelling stronger. It could be worked up to double its strength, but did not thereby give off double the amount of fume. Had sometimes known some of his men affected by the liquor. The vapour arising from the liquor he never knew to be dangerous. It affected the eyes, but not the throat. Was not aware of any accident until he returned home at eleven o'clock in the evening. Went to the gas-works, and awaited the arrival of Dr. Carnley. They went down into the cabin, and found the cat sat purring, and a smell of the liquor, but not so strong as he expected to find. Had no reason to suppose that the liquor was different from that which they had been supplying for two or three years. When a man went down into a tank at the gas-works he had a rope round him. Did not think that the smell of ammoniacal liquor would cause death. Had not heard of any accident before from the liquor. Believed death to have resulted from some other cause. Probably it might have resulted from carbonic acid generated by the ammoniacal liquor. Had had his men down in the tanks from five to ten minutes. Ten minutes was the longest time they remained. There was nothing, as far as his knowledge of the liquor was concerned, to cause death. The matter which surprised him was that there was no alarm.

James Carter said he was a workman at the gas-works. Had worked there eight or nine years off and on. Had never been down to the tanks where the gas water was kept. Was fetched out of the works to the vessel about half-past seven o'clock. Assisted in getting Booth and his wife out of the cabin. Went

into the cabin and handed the children out. They were quite dead. There was a smell of ammonia in the cabin, which was very strong the first time he went down. Saw a fire, which was burning brightly. Had to stoop to lift the children. Thought the smell was not so bad near the deck as near the roof. The cabin was very small. The smell seemed to affect the throat. Was down between four and five minutes.

Mr. *Holden*, surgeon, said the liquor gave out a smell principally ammonia and sulphuretted hydrogen. It contained principally ammonia. Ammonia was under some circumstances productive of death. It produced a spasm which caused suffocation. It would cause death; with an adult there would undoubtedly have been a struggle, but not with a child. If the ammonia were spread on a large surface, it would give out a larger amount of gas. He had no doubt that they died from suffocation, caused by the vapour arising from the ammoniacal gas, but how it got there he did not know.

Henry Ralph Benson, assistant to Dr. Munroe, said he went down to the gas-works about half-past eight, and saw the five bodies. Examined them, and found that life was extinct. Put his head down the companion, and smelt a very disagreeable smell. Considered that the cause of death was the smell from the sulphuretted hydrogen.

William Booth deposed that he lived at Goole, and was a sloopman. Was brother to Thomas Booth. Was master of the vessel for about four months before November. Had known two of the four tanks leak. When they leaked there was a bad smell in the cabin when the wind was aft. Had to go on deck sometimes during the night because he could not breathe. They had often lost two tons of the liquor by the leaking every voyage, which had been pumped overboard. The starboard tank was the worst, it leaked about half-way from the bottom. Could both see and hear it leak, and could not caulk it with oakum because of the smell. Had seen his brother, who told him that the tanks leaked very much. Never knew anything like vitriol carried on board of the vessel.

The inquest was then adjourned for a week.

On Thursday, March 10, the inquiry was resumed.

John Fishwick and *John Tune*, two men formerly employed on board the *Sarah*, deposed to the leaky condition of one of the tanks, and the smell which they had experienced while sailing in her.

William Everingham said he resided in Dock Office Row, and was foreman of shipwrights. In consequence of a note received he went down and examined the *Sarah*. She was lying opposite the British Gas-Works, andl ooked to be old. The port tanks would be a little fuller than the other side ones. The starboard tank was 24 inches from being full, and the port fore tank about one inch from being full. The midship tank was 22 inches higher than the deck, and there was a filling-hole at each side. Nothing could run down the side of the tanks, they were close to the deck of the vessel. There were six inches of liquor out of the starboard midship tank, and the port side was full. The after tank was also full. Did not go in the forecastle, which did not smell very strong. Went down into the cabin, in which the smell of ammonia was very strong, in company with a man from the gas-works. They took a board up in the cabin, and put something down it to measure with, and found 13 inches of some kind of liquid in the vessel's bottom. Thought the liquor would extend for 20 feet. In the midships the whole floor of the vessel would be covered with the liquor. The cabin floor was not tight. The floor of the vessel would be about 12 feet wide in midships. There would be about 300 superficial feet of surface giving off vapour. The cabin would be about 6 feet deep, 8 feet wide, and 7 or 8 feet long. The cabin would be about the usual size of vessels of that class. Gave the man who was in the cabin with him a dipper, who took it out of the soft-hole and showed it to Mr. Copland. Did not know how the liquor had got into the bottom of the vessel. The liquor smelled very strong.

Mr. *Copland*, in reply to the coroner, said the liquor was a mixture of water and gas liquor, there being a larger proportion of water.

Witness said the leakage in the tank could not be stopped by clay because no one could get to the tanks to do so. There would be no difficulty in building a house on deck, but it would inconvenience the steering.

William Booth, brother of the deceased captain, and the witness *Fishwick*, were recalled, and deposed to attempts made to stop the leakage.

Mr. *Copland* said he went with Mr. Everingham to examine the sloop, in company with a man from the gas-works. Everingham and the man went down and took up a portion of the cabin floor, and after taking out some of the liquor, sent it up for witness's examination, when he found that it was a mixture of gas liquor and water—a greater part being water. On examination he found that the liquor by mixture was only one degree of strength, their liquor delivered to the sloop being 8½ degrees. He could not believe that the ammoniacal liquor could cause death. It seemed to him, from the expression of the deceased woman and children, as if a blast had come and destroyed life instantaneously, but he did not know anything in the gas which would cause death under ordinary circumstances. He suggested that there should be cabins on deck.

Mr. *Meek*, of the alum works, said he was a sloop and ship owner. The sloop *Sarah* had been employed fetching gas water for fifteen years. Had been told by Booth that the tanks leaked, but did not therefore apprehend any danger, as other vessels employed in the trade leaked equally bad. Booth told him of the leakage, which he said he would repair as soon as he had an opportunity. Was not aware that William Booth had attempted to stop the leakage by clay and sawdust. Had been told by a chemist at Goole that the effluvium given off by the gas water was not injurious. Had had ten or twelve applications for the situation on board the *Sarah* since the decease of Thomas Booth.

Dr. *Walton* said his opinion was that the ammoniacal liquor, having been under pressure, had, when pumped into the tank, become free, and thus a larger amount of gas had been evolved.

Mr. *Copland* said that the gas water was not subjected to pressure at the gas-works.

The jury then retired, and on returning gave the following verdict:—"The jury are unanimously of opinion that the cause of the deaths of Booth, his wife, and his three children, was from inhaling fumes arising from gas water, causing suffocation. They are likewise of opinion that the tanks in the sloop *Sarah* were not in a fit state to receive the dangerous cargo, and that they had been known to be so for some months. From the evidence before them, negligence has been known to prevail on the part of the owner, in not repairing or causing repairs to be done when informed of the leaky state of the starboard fore tank in particular. The jury recommend that persons living on board any vessel carrying this dangerous compound shall be provided with sufficient cabin accommodation in a round-house on the deck, and for the future no one to be allowed to sleep in an after or fore cabin similar to the sloop *Sarah's*."

REDUCTION IN THE PRICE OF GAS AT DOVER.—At a recent meeting of the directors of the Dover Gas Company, it was resolved that the discount for prompt payment should for the future be at the rate of 6d. per 1000 cubic feet, thus reducing the net price of gas to 4s.

DR. FRANKLAND'S ANALYSIS OF THE METROPOLITAN WATERS IN FEBRUARY, 1870.—"Royal College of Chemistry, Feb. 26, 1870.—Sir, I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of February. For the purpose of comparison, I append also the results yielded by the water supplied to the town of Manchester, and by Thames water taken at London Bridge at low water on the 8th of December last. The proportion of organic matter in the water drawn from the Thames and the Lea has experienced a great reduction since my last report. The reduction is seen least in the water delivered by the West Middlesex Company, because this company, having the largest storeage capacity, was supplying water which had been abstracted from the river at an earlier date than that supplied by the other companies. Of Thames water, that delivered by the Southwark and Grand Junction Companies contained the smallest proportion of organic matter. The New River Company's water from the Lea springs and wells contained still less, and that supplied by the Kent Company from deep wells in the chalk the least proportion of organic matter. The exceptional impurities and turbidity noticed in the East London Company's water last month have disappeared, although the previous sewage or animal contamination, as indicated both by nitrates and chlorine, is greater than that in any of the other river waters. The water delivered by the Lambeth Company was again turbid, that of the Chelsea and Grand Junction Companies slightly turbid, whilst the rest of the samples were perfectly clear when drawn from the companies mains. The temperature of all the samples was much lower than in the previous month, averaging only 7·4° Cent., and no living organisms were found in any of them:—

Companies.	Date and Place of Collection.	Temperature in Centigrade Degrees.	Total Solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Previous Sewage or Animal Contam. (Estimated).	Chlorine.	Total Hardness.
Thames.											
Chelsea.....	Feb. 1—Cab Rk., Horse Guards.	5·0	31·62	·184	·019	·009	·383	·402	3510	1·60	24·08
West Middlesex	Feb. 1—Cab Rk., Portland Road.	4·4	32·68	·249	·024	·001	·384	·409	3530	1·61	24·38
Southwark & Vauxhall..	Feb. 1—Cab Rk., St. George's Ch.	4·7	31·88	·180	·018	·001	·379	·398	3480	1·55	24·38
Grand Junction.....	Feb. 1—Cab Rk., Woodstock St..	3·9	32·36	·180	·022	·001	·385	·408	3540	1·54	24·58
Lambeth....	Feb. 1—Cab Rk., Lambeth Road.	4·2	31·30	·184	·023	·000	·380	·403	3480	1·50	24·38
Other Sources											
New River...	Feb. 1—Cab Rk., Totnhm. Ct. Rd.	4·7	31·70	·173	·017	·000	·350	·367	3180	1·52	26·13
East London.	Feb. 2—Slater's, Old Ford Road.	5·3	36·60	·246	·024	·000	·394	·418	3620	1·90	26·13
Kent.....	Feb. 2—Deptford Bdge. Police Sta.	5·4	30·74	·073	·010	·000	·380	·390	3480	2·30	29·36
Thames water filtered....	December 8, 1869—Lond. Br., mid-str., at low wat.		34·3	·558	·085	·103	·351	·521	4040	2·60	25·25
Manchester..	January 29, 1870.		5·74	·070	·007	·001	·000	·008	0	·80	2·48
Column 1	2	3	4	5	6	7	8	9	10	11	12

The numbers in columns 4, 5, 6, 7, 8, 9, 10, 11, and 12 all relate to 100,000 parts of the waters. The table is to be read thus: The Chelsea Company's water collected on the 1st of February, at the Horse Guards cab rank, had a temperature of 5·0° Cent.; 100,000 lbs. of it contained 31·62 lbs. of solid impurity; the organic matter, constituting a portion of this impurity, contained ·184 lb. of carbon and ·019 lb. of nitrogen. This solid impurity also contained ·383 lb. of nitrogen in the form of nitrates and nitrites, and no ammonia, whilst the total amount of *combined* nitrogen in every form was ·402 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or animal matter equivalent to 3510 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames and its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage or animal contamination had been converted into innocuous inorganic compounds before its delivery to consumers. The above quantity of water also contained 1·6 lb. of chlorine. Finally, 100,000 lbs. of the Chelsea Company's water contained 24·08 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients.—I have, &c.,

"E. FRANKLAND.

"The Registrar-General, &c."

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN FEBRUARY, 1870:—

FEBRUARY, 1870.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	Feb., 1869. 0°	Feb., 1870. 0°	Feb., 1869. 0°	Feb., 1870. 0°	0°
Distilled Water . . .					
West Middlesex water .	19·16	20·08	·80	·96	—
Grand Junction water .	20·16	20·56	·96	·96	—

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN FEBRUARY, 1870:—

FEBRUARY, 1870.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	16·72	17·50	16·17	28·36	10·24	33·99	0·91	None.
Chartered Company's common gas	16·43	17·20	15·79	40·57	15·24	35·08	2·07	None.
Chartered Company's cannel gas	23·22	23·82	22·64	33·86	14·98	36·29	1·16	None.

Mean of daily readings of Barometer . . . 29·62

" " " Thermometer . . 48·96

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas was equal to 16·72 sperm candles, and was exceedingly steady during the month, the range being between 16·17 and 17·50 candles; on five occasions it exceeded 17 candles, and on no occasion did it fall below the now legal standard of 16 candles. The quantity of sulphur impurity was still large, amounting to 33 grains in the 100 cubic feet, but as the maximum quantity to be allowed has not yet been determined upon, penalties for any excess of this most deleterious impurity cannot be

enforced. The quantity of ammonia was very small, amounting to less than one grain in 100 cubic feet. The mean light of the Chartered Company's common gas was equal to 16·48 candles; on two occasions only it fell slightly below the legal standard of 16 candles. The mean quantity of sulphur found in 100 feet of gas was 35 grains, and of ammonia only 2 grains. The cannel gas of the Chartered Company gave a mean light equal to 23 candles. The sulphur amounted to 36 grains, and the ammonia to a little more than 1 grain. On no occasion was any trace of sulphuretted hydrogen detected in either of the gases by the ordinary tests. The pressure of all of them was uniformly satisfactory. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas, manufactured at their works, Horseferry Road, Westminster.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN FEBRUARY, 1870.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	23·90	0·111	0·066	0·002	15·0	4·9
West Middlesex	22·21	0·051	0·091	0·000	14·9	4·6
Southwark and Vauxhall	21·03	0·145	0·076	0·002	14·6	4·5
Chelsea	23·17	0·164	0·091	0·001	15·0	4·8
Lambeth	21·47	0·062	0·110	0·002	14·4	4·4
Other Companies.						
Kent	30·97	0·035	0·168	0·001	20·5	6·0
New River	24·53	0·020	0·091	0·000	15·9	4·8
East London	24·00	0·062	0·110	0·002	16·0	5·1

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and, in the case of the metropolitan waters, the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, the Grand Junction water and the Chelsea water. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 94,796,423 gallons; and the number of houses supplied was 476,194. This is at the rate of 29·9 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 27·7 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne.

HY. LETHEBY, M.B.

DR. STEVENSON'S REPORTON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTH OF FEBRUARY, 1870.

Date.	Number of Observations.	Average Light in Candles produced by 5 Ft. of Gas per Hour.	Light in Candles reduced to Consumption of 120 Grs. per Hour.	Traces of Ammonia.	Traces of Sulphuretted Hydrogen.
Feb. 2	10	12·0	13·3	Present.	None.
4	10	12·8	14·2	,,	,,
7	10	13·6	14·9	,,	,,
8	10	12·4	13·8	,,	,,
10	10	12·6	14·0	,,	,,
11	10	13·1	14·4	,,	,,
Feb. 12 to Feb. 16	Meter frozen.				
Feb. 17	10	14·0	13·7	,,	,,
19	10	13·2	14·0	,,	,,
21	10	13·5	14·5	,,	,,
22	10	13·3	14·6	,,	,,
24	10	13·4	14·4	,,	,,
26	10	13·1	14 3	,,	,,

The average illuminating power of the gas was 14·2 standard sperm candles, the maximum being 14·9 candles on the 7th, the minimum 13·3 candles on the 2nd of February. The total amount of sulphur was 26·41 grains per 100 cubic feet. Ammonia was always present, and sulphuretted hydrogen invariably absent. The gas was of the usual quality. The testings were made in accordance with the Metropolis Gas Act of 1860. THOS. STEVENSON.

Register of New Patents.

188.—FREDERICK LIPSCOMBE, of 233, Strand, in the co. of Middlesex, water-filter manufacturer, for "*Improvements in purifying and storing water, and in the apparatus employed therein.*" Patent dated Jan. 20, 1869.

In carrying out this invention a chamber is constructed in the lower part of the filter, through which, by means of an aperture, the unfiltered water flows, finding an exit through another aperture to any convenient part or parts of the house or building when necessary. The top side of the chamber is perforated with holes through which the unfiltered water in the chamber flows upwards through the filtering media, which is composed of animal or vegetable charcoal, plates of porous stone, or any of the usual filtering media, separately or in combination, whence the purified water is drawn off, either directly through one or more pipes leading to the outside of the cistern, or the purified water after leaving the filter is allowed to flow into a pure water reservoir placed or formed in the cistern, whence it is drawn off as required.

227.—CLINTON EDGCUMBE BROOMAN, of the firm of Robertson, Brooman, and Co., of 166, Fleet Street, in the City of London, patent agents, for "*Improvements in the construction of cocks or valves.*" A communication. Provisional protection only obtained. Dated Jan. 25, 1869.

This improved apparatus consists of a cylindrical or other shaped case or box, either of metal, wood, porcelain, or other material, formed at one end or both ends with a flange, to which flange the end of a flexible pipe, through which the fluid is free to pass, is secured. One end of another flexible pipe is also connected to the flange of the cylinder. This pipe forms a continuation of the first-mentioned pipe; the cylindrical case is furnished with a threaded rod, which passes through it. The inner end of the rod has a plate fitted to it, which, when raised, enters an aperture or chamber in the case. The other end carries a handle or small wheel, by which it may be turned. The plate on the inner end of the threaded rod is caused to press when the handle is turned upon that portion of the pipe which passes through the cylindrical case, whereby the pipe is compressed, and the flow of fluid regulated or entirely stopped.

243.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in ventilating apparatus.*" A communication. Patent dated Jan. 26, 1869.

The body of the ventilator consists of a wedge-shaped box attached to a supporting frame or diaphragm intended to secure the body to the window. There is an adjustable funnel for adapting the ventilator to double windows, and a perforated shelf for holding a sponge or other porous absorbent. A perforated box for holding charcoal fits closely into the top of the body, but is capable of being removed at pleasure. A sliding valve regulates or cuts off the supply of air, and a foul air escape-pipe is used in connexion with stoves. When double windows are not used the adjustable funnel will not be required, and in such cases that part of the invention may be dispensed with.

248.—COLIN MATHER, of Salford, in the co. of Lancaster, engineer, for "*Improvements in machinery or apparatus for singeing fabrics by gas flames.*" Patent dated Jan. 27, 1869.

This invention relates to those singeing-frames in which the fabric is brought against both sides of the flame, and in which the combustion of the gas is promoted by causing a current of cold air to be drawn towards or through the flame. This current of air is produced by a fan or other equivalent, which exhausts the air out of a slotted tube, and this invention consists in the application of certain parts to the above machines whereby the results produced by the process of singeing are greatly improved. In carrying out this improvement the inventor applies a doctor or thin blade of metal, or a roller with blades against the surface of the fabric that has been singed, and this doctor is adjustable so as to act with more or less force on the fabric as it passes one guide roller or rail to the other. The effect of the fabric passing over the doctor is to detach the carbonized particles, and when the doctor is placed in a slot in the air-tube these particles are carried away by the fan.

276.—GEORGE HAWKSLEY, of Montrose Villas, Caledonian Road, in the co. of Middlesex, engineer, for "*Improvements in the manufacture of ventilators and chimney-pots.*" Patent dated Jan. 29, 1869.

The improvements consist in forming the ventilators or pots from a long metal band—say of hoop iron—which is turned into a coil by being extended on one edge more than on the other. This is done by passing the hoop iron between rollers which are set so as to form a taper nip, and the roller may be so formed as simultaneously to give to the iron a curved face; or, in place of expanding the outer edge of the hoop iron, a similar result may be obtained by corrugating its inner edge. A cylindrical mandrel is then employed of the size of the interior of the ventilator or pot which it is desired to produce, and having in it a number of longitudinal radial grooves equidistant the one from the other. In these grooves other flat pieces of hoop iron are placed, having inclined notches in them at equal distances apart from end to end of each piece.

281.—SYDNEY SMITH, of the Hyson Green Brass-Works, near Nottingham, for "*Improvements in taps or valves for regulating the flow of steam, water, and other fluids.*" Patent dated Jan. 29, 1869.

According to this invention the body of the tap or valve which is adapted to be screwed or otherwise connected with the supply-pipe or passage, and usually also to a delivery-pipe, is formed with a water or fluid way through it. A conical hole is formed in the body from one side, and into it a corresponding plug fits, which, when in its place, closes the water or fluid way through the body. On the side of the body, and over the conical recess for the plug, a chamber is formed, and when the plug is drawn back to open the water or fluid way it is received into this chamber, and leaves the passage way clear of all obstructions, with an undiminished area for the direct inlet and outlet of the volume of steam, water, or other fluids, which may be conveyed to the passage; the plug is raised and lowered by a screw, the stem of which passes through the cover of the chamber, and receives a handle or handwheel on the exterior.

282.—GEORGE HAWKSLEY, of Montrose Villas, Caledonian Road, in the co. of Middlesex, engineer, for "*Improvements in pumps, and in apparatus connected therewith.*" Patent dated Jan. 29, 1869.

These improvements consist in casting the barrel of the pump with a foot at its lower end, by which it is fixed, and at its upper end a head and spout suitable to receive and deliver the water from the barrel, and to support the fulcrum of the lever handle. Below the portion of the barrel to which the pump-bucket is fitted is a cavity of larger diameter closed at the bottom, with the exception of the suction passage which passes through it, and beneath which is a socket receiving the suction-pipe. Into the cavity at the lower end of the barrel is a side opening closed air-tight by a cover. The cover has lugs upon it on the inner side, and a piece of sheet india-rubber or leather, which forms both the hinge and the packing of the valve over the suction-passage, is held by these lugs, which are simply passed through holes formed for them in the india-rubber. The metal valve is connected with the india-rubber by means of a central boss on the valve, over which the india-rubber is sprung, a corresponding hole being formed in the india-rubber, and a groove being cut around the bottom of the boss into which the india-rubber nips.

289.—THOMAS WHIMSTER, of Perth, in the co. of Perth, N.B., gas engineer, for "*Improvements in apparatus for exhausting, washing, and forcing gaseous or aëriform bodies.*" Patent dated Jan. 30, 1869.

The apparatus employed is rotary, and comprises a drum fixed on and turned by means of a horizontal shaft being placed in a casing partly filled with water or other suitable liquid. The space above the water is divided into three compartments by two hanging partitions, which dip down below the surface of the water, and the drum is in the middle compartment between the two partitions, whilst it is with the same middle compartment that the pipe for admitting the gas communicates. The drum may be varied in form, but it is preferred to construct it with two plain discs, formed with eyes at the centres, and connected by spirally bent partitions.

314.—NICHOLAS VOICE, of Handcross, in the co. of Sussex, plumber, for "*Improvements in apparatus for regulating the flow of water or other fluids, applicable to water-closets and other purposes.*" Provisional protection only obtained. Dated Feb. 2, 1869.

In carrying out this invention, a tube of india-rubber is enclosed at one part of its length in an outer tube of metal or other suitable material. This outer tube is provided with a boss or enlargement, in which a lever, screw, or other appliance for exerting pressure on the rubber tube is fitted. If the appliance for exerting pressure be a weighted lever, it compresses the portion of the rubber tube which is within the boss, and thereby prevents passage of water through it, but when the lever is raised by any ordinary means, the rubber tube is free to resume its natural form, and to permit the fluid to flow through it.

328.—JAMES HIGGS TYRRELL, of Hadleigh, Rochford, in the co. of Essex, for "*An improved method of measuring and drawing off any given quantity of liquid from a vat or other vessel containing it in bulk, and in registering the quantity so drawn off or abstracted from time to time.*" Provisional protection only obtained. Dated Feb. 3, 1869.

This invention consists of improved mechanical arrangements connected with a tap or cock, whereby the quantity of liquid required to be drawn off is first measured into a closed vessel from the vessel that contains it in bulk, and the plug of the tap or cock is so constructed that when it is opened to discharge the contents of the aforesaid closed vessel containing the precise quantity to be drawn off, the tap shuts off the communication between the closed vessel and the vessel from which it is supplied. In connexion with the plug is a pin or stud, which, as the cock is shut, operates upon a train of wheels for indicating

by dials, and a hand on each pointing to figures on the dials, which indicate the gross number of measures of quantity of the liquid drawn off, the dials being visible through a piece of glass fixed in front of them.

344.—THOMAS PANKHURST the elder, and THOMAS PANKHURST the younger, both of Clover Street, Chatham, in the co. of Kent, builders, for "*Improvements in gully-traps.*" Provisional protection only obtained. Dated Feb. 4, 1869.

These improvements consist in furnishing sewer gratings or gullies with an under or catch receptacle having a passage way or hole in it furnished with a moveable pan, flap, or door, pressing against such passage way or hole attached to a lever bearing an equipoise. The pan, flap, or door will, therefore, be self-acting when any material or fluid falls on it from or through the catch receptacle by reason of the weight of such material or fluid, and after allowing it to pass will then close and so trap the hole or passage way in the bottom of the catch receptacle, and thus prevent the escape of effluvia.

357.—JOHN PAGE, of Glasgow, in the co. of Lanark, N.B., civil engineer, for "*Improvements in pipe-joints, and in cement for the same, and applicable otherwise.*" Patent dated Feb. 5, 1869.

According to this invention the external joint service of the spigot is made either cylindrical or slightly conical, and the internal joint surface of the faucet (or of the ring when a ring is used) is made slightly conical, and with the more contracted part towards the outside of the joint. A hydraulic cement, of any suitable kind, is rammed into the space between the joint surfaces, and forms a ring of a wedge-shape in longitudinal section, the internal pressure acting on the base of the wedge so as to jam it tighter the greater the pressure is.

371.—ROBERT SNOOK, of 18, New Street, Horselydown, engineer and brass-founder, for "*Improvements in cocks, taps, and valves for regulating the supply of steam, or water, or other fluids.*" Provisional protection only obtained. Dated Feb. 6, 1869.

The improvements consist in the construction of a chamber or barrel of suitable form and material, fitted to receive a conical plug, which plug is disposed horizontally and centrally within the barrel. This conical plug is made hollow, and has the larger end of the cone open, which opening serves for the admission of the fluid, which fluid has its exit through an orifice left in the side of the conical plug.

389.—HENRY JOHN RICHMAN, of 48, Porchester Terrace, in the co. of Middlesex, for "*Improvements in fans or apparatus for forcing or drawing air.*" A communication. Patent dated Feb. 8, 1869.

According to this invention a turbine or fan is constructed with two discs, the one solid or close, the other open in the centre to admit the air. A ring or flange is formed round this opening, and revolves air-tight in an opening at the front end of the casing. The spindle or shaft is fixed in the centre of the solid disc, and passes through the opening in the other end of the turbine or fan, without being attached to it, to a bearing in which this end of the spindle which carries the pulley turns.

390.—FLEEMING JENKIN, of 5, Fittis Row, Edinburgh, professor of civil engineering in the University of Edinburgh, for "*Improvements in apparatus for producing electric light.*" Patent dated Feb. 8, 1869.

In this improved apparatus the light is produced by a rapid succession of sparks due to successive charges and discharges of a condenser charged directly from a voltaic battery without the intervention of any induction coil. When the invention is used for lighthouse purposes the condenser is on the beacon, and the battery on shore is connected with a terminal on the beacon by a submarine cable or aërial wire. The condenser is charged and discharged by a tongue or contact-maker moving backwards and forwards between the battery terminal and an earth terminal.

403.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in apparatus for heating and ventilating.*" A communication. Patent dated Feb. 9, 1869.

In this invention a radiator and ventilator is so constructed that a thin stratum or column of steam is exposed on two sides of the external air intended to be heated, the combined area of the surface of these two sides being much greater than the exposed surface of the radiators now commonly in use. The steam has a direct passage through the radiator, and as it does not follow a tortuous course its movement is rapid, and the whole interior is quickly filled, condensation takes place rapidly, and induces a swift current of the external air through the heated central tubes.

414.—SAMUEL MELLOR, of Park Terrace, Old Ford, Victoria Park, in the co. of Middlesex, for "*Improvements in the construction of pumps for raising and forcing water and other liquids,*" Provisional protection only obtained. Dated Feb. 10, 1869.

In carrying out this invention the barrel of the pump is formed of a tube of any suitable elastic or flexible material. Within a casing, semicircular at the upper part, a piece of elastic tubing is adapted, which passes through holes formed through the rim of the casing, one hole being formed through one side of the rim, a little above the springing of the semicircular part thereof, and the other hole through the opposite side of the rim, a little below the springing of the semicircular part thereof, so that when the tube is passed through the holes it follows the curvature of the inside of the curved part of the casing. Through the sides of the casing, and at the centre from which the semicircular part is described, holes are formed, and a short horizontal shaft or axle is adopted, working in suitable bearings, and on the shaft or axle is fixed a piece of metal carrying two rollers mounted thereon at opposite sides of the shaft, and in a line with the centre thereof.

423.—JOHN CARTER, of Birmingham, in the co. of Warwick, boat-builder, for "*Improvements in water-closets.*" Patent dated Feb. 10, 1869.

Underneath the ordinary basin, with its moveable bottom or pan, is placed a second basin having a moveable bottom or pan, which is brought into its raised position by a counterbalance weight or spring. The axis of the moveable bottom of the second or lower basin is so connected by a chain or otherwise with the axis of the moveable bottom of the upper or ordinary basin that the raising of the moveable bottom of the upper or ordinary basin causes the depressing of the moveable bottom of the lower basin.

429.—JAMES YOUNG, of Limefield, in the co. of Mid Lothian, N.B., gentleman, for "*Improvements in apparatus for measuring the pressure of gases and the force of aëriform or gaseous currents.*" Provisional protection only obtained. Dated Feb. 11, 1869.

To measure the pressure of gases and the force of aëriform or gaseous currents, a U-tube containing water in both limbs is often used. The inventor puts a cistern or overflow on one or both arms of the tube, and uses two liquids of different densities, by which means he increases the sensitiveness of the instrument in proportion as the liquids approach each other in density.

432.—BENJAMIN PEYOR STOCKMAN, of 23, Abingdon Street, Westminster, in the co. of Middlesex, civil engineer, for "*Improvements in meters applicable to measuring water.*" Patent dated Feb. 11, 1869.

These improvements consist in the employment of two cylinders and pistons combined, and working with a reciprocating action—viz., one piston up while the other is down. The two cylinders are placed side by side on a base-plate common to both. The cylinders are bored out, and the pistons are packed with a cupped leather, or with any other suitable packing, to ensure their working water-tight, or the means of rendering them water-tight may be bags of leather or india-rubber attached at one end to the cylinder and at the other to the piston; when this method is adopted it may not be necessary to bore out the cylinders. At the top of the cylinders there is a capping-plate, upon which is seated the whole system of gearing comprising the valve apparatus. Each piston has a toothed rack attached to it in place of a piston-rod, and the two racks pass through holes provided for the purpose in the capping-plate. Between the two racks is a toothed wheel in gear with both, which gives the reciprocating action to the piston. A four-way valve is fixed on the capping-plate centrally with the toothed wheel, and from two of the openings in the valve there is a communication with the bottom of the cylinders by means of pipes or passages cast in the cylinders, while the two other openings in the valve have the supply and discharge pipes attached to them.

444.—FRANK CLARKE HILLS, of the Chemical Works, Deptford, in the co. of Kent, manufacturing chemist, for "*Improvements in the furnaces of gas-retorts, and in means and apparatus for effecting the combustion of fuel in the said furnaces.*" Patent dated Feb. 12, 1869.

This invention consists in improvements on a former invention, for which the present patentee obtained letters patent bearing date April 29, 1864 (No. 1087), which invention consisted in the use in furnaces of air heated by the waste heated gaseous products of combustion, which air was introduced into the closed ash-pit of the furnace instead of cold air. It is found in practice that the heat generated in the furnace by the above method is so intense as to destroy the furnace-bars and furnace too rapidly.

The present invention greatly prevents such intense heat by the means hereinafter described. Into the closed ash-pit of the furnace, air is introduced heated by the waste heated gaseous products of combustion, but the heat generated by the said air is tempered by mixing therewith a portion of the waste heated gaseous products of combustion which escape from the furnace through the flue to the chimney. The carbonic acid and nitrogen contained in the said products, when mixed with the atmospheric air introduced into the furnace, diminish the intense local heat which heated air generates when introduced by itself, and the heat is by this means the better diffused through the bed of retorts, and a saving of fuel is effected. The pipes or chambers in which the air to be introduced into the ash-pit is heated are placed or formed in the escape-flue leading from the furnace to the chimney, so as to be surrounded as much as possible by the red-hot waste gaseous products of combustion, and the escape-flue communicates with the said air-heating pipes or chambers by means of a pipe, in the centre of which a jet-pipe is inserted, in such a manner that when atmospheric air is forced through it from a fan or air-pump the jet of air will draw a portion of the waste products of combustion from the escape-flue aforesaid, and will force such portion into the air-heating pipes or chambers. The jet of air thus forced into the air-heating pipes or chambers will mingle with the hot waste gaseous products of combustion drawn or forced in with it, and both together will pass through the said air-heating pipes or chambers, and from thence into the furnace, either through the ash-pit or above the fire-bars, as hereinafter described. It is preferred to make the air-heating pipes or chambers hereinbefore referred to of fire-bricks, fire-tiles, or fire-clay, or other such like refractory material, and to place or form the said pipes or chambers at a lower level than that of the ash-pit or fireplace. The whole of the atmospheric air required may be introduced in the form of the jet described, or a portion may be drawn into the heating-pipes or chambers aforesaid through a separate pipe. The gaseous products of combustion, when sufficiently cooled to pass through a fan or an air-pump, may be used as a jet instead of atmospheric air to draw and force in the hot waste gaseous products of combustion; but in this case all the atmospheric air required must be drawn through the separate pipe above described into the air-heating pipes or chambers, there to mingle with the said hot waste gaseous products of combustion, and thence to pass into the closed ash-pit Instead of admitting the hot air mixed with the hot gaseous products of combustion into the ash-pit, a flue may be made around the sides and back of the furnace, about four inches above the fire-bars, and slots or pigeon-holes about two inches deep, communicating with the said flue, may be made around the sides and back of the said furnace in order to admit the hot air and gaseous products aforesaid to the fuel in the furnace, and thus keep the fire-bars comparatively cool.

488.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane in the co. of Middlesex, consulting engineer, for "*An improved method of obtaining benzole and its homologous substances from coal gas.*" A communication. Patent dated Feb. 17, 1869.

The gaseous products resulting from the destructive distillation of coal, commonly called coal gas, contain a variable amount of benzole and its homologues, which, as is well known, may partly be separated therefrom by submitting the gas to cold or pressure, or to a treatment with chemical re-agents, such as nitric and sulphuric acids, chlorine, and bromine.

The said improved method of obtaining benzole and its homologues from coal gas consists in placing coal gas in contact with such substances which act as solvents for the benzole and homologues contained therein, without, at the same time, causing them to undergo any chemical change, and, while it has been found that all known solvents of benzole will effect this purpose, it is preferred to place coal gas in contact with certain hydrocarbons, such as petroleum, schist, and mineral oils, and the higher boiling varieties of coal tar naphtha, as these hydrocarbons are easily procurable, and interfere little, if at all, with the illuminating power of coal gas, and by mere distillation the said benzole and its homologues may be separately obtained from their solution therein, and the solvent rendered again fit for renewed application.

In those cases in which it is essential not to injure the luminosity of coal gas by depriving it of its benzole, it is preferred to employ as absorbing agents the higher boiling varieties of coal tar naphtha, the boiling points of which range from 130° centigrade upward, and it has been found that by placing coal gas in contact with such hydrocarbons they will take up benzole and its homologues from the coal gas, while the latter becomes charged with the vapours of the liquid hydrocarbons employed. Although any suitable apparatus may be made use of in order to effect the contact of coal gas with the absorbing agent, the employment of the common coal-gas purifiers, or so-called scrubbers, is preferred. The gas enters at the bottom of the apparatus, and while ascending it meets a shower of finely divided coal-tar naphtha, which descends from the top of the scrubber, and at a rate varying, say, from 20 to 40 gallons for every 10,000 cubic feet of gas traversing the apparatus. This operation is effected after the final purification of the coal gas, and immediately before its passage to the gasholders. The liquid hydrocarbon which arrives at the bottom of the apparatus charged with benzole is drawn into a still or other suitable vessel, which is heated by steam or otherwise to a temperature of about 130° centigrade. The distillate or hydrocarbon obtained by this distillation, which generally amounts to 10 or 15 per cent. of the whole liquid, contains chiefly benzole and toluole, which formerly were diffused in the coal gas, while the residue in the still is again transferred to the scrubber for renewed application.

Although one way only is described in which the separation of benzole from coal gas is effected, and which is preferable in such cases where coal gas is used as an illuminating agent, the patentee claims the use of all known solvents of benzole, provided they have no chemical action upon it, and especially mentions petroleum, hydrocarbons, schist, and mineral oils, liquid and solid fats and resins, coal tar, and coal-tar naphthas, heavy oils, pitch, and similar substances

523.—GEORGE GERARD HAIRS, of 6, Little Distaff Lane, in the City of London, for "*Improvements in burning and vaporizing combustible liquids to obtain light and heat, and in apparatus employed therein.*" Provisional protection only obtained. Dated Feb. 20, 1869.

It is proposed to place over a gas-burner a vessel or generator of a double cup-like form, which is sometimes surrounded by a chimney. Petroleum or the combustible liquid to be vaporized is placed in the inner cup, which is closed air-tight. Gas is admitted by a pipe to the upper part of the cup-formed generator, and after passing over the surface of the petroleum or other liquid (which, being heated, gives off vapour freely) it passes away to the burner beneath by a pipe descending through the bottoms of the double-cup generator. Other pipes may also be connected with the double-cup generator, to lead off the gas or vapour to other burners, as may be required.

528.—ARTHUR JACOB, of Bromley, in the co. of Kent, civil engineer, for "*Improvements in the ventilation of sewers.*" Patent dated Feb. 20, 1869.

This invention consists in purifying the effluvia in their escape to the surface of the ground, and by facilitating the disposal and removal of charcoal or other material having the property of destroying the injurious effects of sewer gases on health by means of man-hole covers.

535.—FRANCIS GEORGE FLEURY, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, for "*Improvements in meters or apparatus for measuring water and other liquids.*" Patent dated Feb. 20, 1869.

In meters constructed according to this invention the casing, which is by preference made in three parts or portions, is constructed so as to form four measuring-chambers, two of the chambers with a common axis being smaller than the other two chambers, which likewise have a common axis, at right angles, however, to the axis of the two smaller measuring-chambers. In meters of large size the two large chambers may be provided with covers. Each measuring-chamber is provided with a piston fitting accurately within it. The pistons of the larger measuring-chambers are both secured to one flat piston-rod, one of the pistons being situated at each end of the rod, the pistons of the two smaller measuring-chambers are secured one to each end of a bar (by preference slotted), or to a frame.

559.—JOSEPH BREEDEN, of the firm of J. and W. Breeden and Booth, of Birmingham, in the co. of Warwick, manufacturer, for "*Improvements in taps or stop-cocks.*" Patent dated Feb. 23, 1869.

The body of this improved tap is made in two halves or parts joined together by flanges, the body having internally the general figure of a hollow cylinder. The entrance-pipe opens into the lower half or part, and the exit-pipe into the upper half or part of the body. A circular disc of strong and hard leather is inserted and fixed between the flanges of the two parts of the body of the tap, the disc constituting a diaphragm extending across the middle of the said body. This diaphragm has one or more perforations in it through which the liquid or fluid passes, and on the lower side of the diaphragm is fixed a metal strengthening plate having an opening in it coincident with that in the diaphragm. In the upper half of the body is a plug, the lower portion of which is of the same diameter as the body, and works closely but freely therein. The upper end or stem of the plug passes out at the top of the tap, and is provided with a handle or with a lever for giving a rotary motion to the plug. The lower end of the plug bears upon the upper side of the leather diaphragm, and has a hole in it similar in size, shape, and position to that in the diaphragm.

560.—JOSEPH JOHNSON and WILLIAM GILL, both of Unstone, in the co. of Derby, joiners, for "*Improvements in rotary engines and pumps.*" Patent dated Feb. 23, 1869.

This invention consists in the employment of a cylinder secured on a foundation, and having a central shaft working in bearings at each end or side of the cylinder. On this shaft is mounted a circular piston revolving eccentrically around and within the cylinder, at the top of which the inlet and exhaust pipes are applied.

561.—BARNARD WILLIAM FAREY, engineer, of the firm of B. Donkin and Co., of Bermondsey, in the co. of Surrey, for "*Improvements in the seatings or facings of gas-valves.*" Patent dated Feb. 23, 1869.

This invention consists of certain improvements in gas-valves, and has for its object the prevention of any escape of gas between the seatings or faces of the valve.

A groove is formed in one or both of the seatings or faces of the valve, into which groove is introduced by any suitable means water, oil, or other fluids, which must be at a pressure exceeding that of the gas for which the valve is employed to regulate or stop the flow. It will be readily understood that should the seatings or faces of the valve not be tight, a leakage of water, oil, or other fluid will take place, thus effectually preventing all escape of gas between the seatings or faces. Any water, oil, or other fluid so leaking through can be taken off by syphons, one on each side of the diaphragm or slide of the valve, or by any other convenient method. When gas-valves are used to divide pure from impure gas, pure gas at a greater or lesser pressure than that of the gas in the pipes may be used as a lute instead of a liquid, when at a greater pressure being supplied from a gasometer, when at a lesser pressure the pure and impure gas from the pipes leaking into a gasometer; the object in keeping valves perfectly tight in this case being to prevent any flow whatever of impure into pure gas. While the valve is open the flow of water, oil, or gas into the groove is of course stopped either by self-acting means within the valve or by any ordinary method.

565.—SAMUEL HOLROYD, of Newton Heath, Manchester, in the co. of Lancaster, manufacturing chemist, for "*Improvements in the recovery of substances used in the purification of gas for illumination, and of waste products arising therefrom.*" Provisional protection only obtained. Dated Feb. 23, 1869.

According to this invention, it is proposed to take the substance which is commonly employed for abstracting sulphur from the gas (oxide of iron, for instance), and place it within a suitable vessel, to which steam or air is admitted, and the temperature thereof being raised, the sulphur is detached from the iron, and may be recovered for the manufacture of sulphuric acid or other ordinary purposes.

571.—WILLIAM WILLIAMS, of No. 4, Mitford Street, Liverpool, in the co. of Lancaster, for "*Improvements in laying and joining pipes for gas, water, and other like purposes.*" Patent dated Feb. 24, 1869.

This joint is designed to avoid the defects found in rigid and inflexible joints as at present formed. It consists in the direct contact or union of a cylindrical socketed with a spherical butt-ended pipe without the intervention or use of lead or packing. The socket end of each cast-iron pipe is made of uniform thickness with the pipe itself, but strengthened when required by an external hoop of wrought iron, and it is then truly bored so as to form a perfect cylinder. Upon the butt end of the pipe a projecting boss or ring is cast, the surface of which is turned truly so as to form a perfect zone of a sphere of an external diameter fully equal and proportioned to the internal diameter of the cylindrical socket. The union of the two metal surfaces is thus perfectly maintained throughout the circular ring or line of contact which within the cylinder is fixed, but varies on the spherical zone according to the angle of direction at which the pipes are joined, and with every change thereof, while the perfection and tightness of the joint remain unimpaired by the change of position. The joint is, therefore, a moveable one, so that in case of change in level or direction by subsidence or disturbance, the pipe-line is self-adjusting, and distortion is unattended by leakage or fracture, as has been conclusively shown by actual experiment with pipes of the largest size. The pipes are easily and quickly united, and in practice it is found expedient in some instances to make the diameter of the spherical zone about 0·05 per cent. in excess of that of the cylinder, and complete the union under the expansion of heat applied to the latter.

575.—ROBERT MORTON, of Bridge House, Nine Elms, in the co. of Surrey, for "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Feb. 24, 1869.

This invention has for its object the securing of the lids to the mouthpieces of retorts of whatever shape they may be, and effecting a gas-tight joint without the intervention of any luting, and consists in casting the mouthpiece somewhat thicker than usual at its outer extremity, so as to form a surface about an inch wide all round. The face of the mouthpiece is then turned, planed, and scraped, or otherwise surfaced. The lid may be made of cast malleable iron or steel, or other suitable metal, but it is preferred to make it of wrought-iron plate stamped, shaped, or fashioned into a concavo-convex form, with its edge bent up all around its periphery. This edge is also turned or planed true, and is by preference semicircular in section, but it may be made of an acute or rounded V shape, in order that the amount of surface brought to bear against the faced front of the mouthpiece may be reduced to a minimum or a mere circumferential line of contact.

The patentee reserves to himself the right to use any other form of edge which does not depart from the specific object of his invention—viz., that of ensuring a sound joint by means of bringing a minimum amount of bearing surface of the lid into actual contact with the mouthpiece of the retort. The reason for forming the edge in this manner is to avoid the necessity of bringing two flat surfaces together, such as the flat-surfaced mouthpiece and a flat-surfaced lid, as it is found from experience to be impracticable to maintain a sound joint by reason of pieces of coal, hardened pitch, or other foreign matter getting between them, and thus preventing the joint from being made sound and gas-tight without great difficulty, waste of gas, and loss of time.

The patentee notes the fact that he is aware that letters patent, No. 142, dated Jan. 17, 1865, were granted to Messrs. Best and Holden for "Charging and drawing gas-retorts, and for other purposes," and subsequently other letters patent, No. 2827, bearing date Oct. 31, 1866, were granted to the same persons for "Improvements in the doors and closures of gas-retorts." The only reason for reciting these patents is to show that the object sought by the inventors was the securing a sound joint by means of two flat surfaces, whereas by this invention this most desirable end is obtained by the reverse and intentional avoidance of their method.

600.—JOSEPH TOWNSEND, of Glasgow, in the co. of Lanark, N.B., manufacturing chemist, for "*Improvements in extracting and in refining oils and other products from mineral and other materials containing carbon and hydrogen, and in apparatus therefor.*" Patent dated Feb. 26, 1869.

In carrying out this invention steam generated in any convenient boiler is passed through piping immersed in a bath of melted metal or alloy, or of a salt or salts in solution, or fused, which superheats it and keeps it at a uniform temperature, and it is then admitted into a retort or still containing the materials from which the oils or other products are to be extracted. The superheated steam enters the upper end of the retort, and is maintained therein at a pressure of at least half a pound per square inch above that of the atmosphere.

604.—WILLIAM ANTHONY HERRING, of the Chertsey Foundry, Chertsey, in the co. of Surrey, ironfounder and engineer, for "*Improvements in pumps.*" Patent dated Feb. 26, 1869.

This invention consists in the employment of a cylinder or pump-barrel, open at both ends, and supported at its centre by a ring standing out from its exterior and passing to the sides of a casing by which the pump-barrel is surrounded. The casing is thus divided into two compartments, one open to one end of the cylinder, while the other is open to its opposite end. The piston-rod passes out through a stuffing-box in one end of the casing, and has a to-and-fro motion given to it in any suitable manner. From opposite sides of each compartment of the casing passes a pipe or passage, the passages from one side leading to an inlet valve-box, whilst the passage from the other leads to an outlet valve-box.

661.—JOHN BERGER SPENCE, of Manchester, in the co. of Lancaster, merchant, for "*Improvements in substances used for the purification of illuminating gas, and in the recovery of a waste product arising therefrom.*" Patent dated March 4, 1869.

This invention consists in manufacturing muriate of iron from certain substances, whereby the said muriate is produced economically and in a suitable condition for the purification of gas, and whereby the ammonia and sulphur are extracted at one operation.

In carrying out this invention, slag derived from the puddling-furnace in the manufacture of iron or from the smelting of copper are employed, and which substances are in a proto state, and ground by any ordinary means. These are treated with muriatic acid in a suitable vessel, using sufficient acid to take up the iron contained in the said substances. Muriate of iron is thus obtained suitable for being transferred to the gas-purifiers in its crude state, or it may be previously crystallized; the effect is that the ammonia in the gas is in the first place taken up, and then oxide of iron remains in a suitable condition for abstracting the sulphur. After the purifying process the remaining mass contains muriate of ammonia, which is washed out and applied to any known purpose. The sulphur may be disposed of as usual.

679.—JOHN BERGER SPENCE, of Manchester, in the co. of Lancaster, merchant, for "*Improvements in the production of substances to be used in the purification of illuminating gas, and in the recovery of a waste product arising therefrom.*" Provisional protection only obtained. Dated March 6, 1869.

This invention relates, firstly, to the production of muriate of iron suitable for the extraction of sulphur and ammonia from gas. To effect this the spent oxide of the purifiers is employed, and the sulphur driven off by any method now practised. Or pyrites from which the sulphur has been driven off in the ordinary manufacture of sulphuric acid are employed, and treated with muriatic acid, preferably with heat, by which means muriate of iron is obtained, which may be used in the purifiers for extracting sulphur and ammonia, which being driven off, oxide of iron remains to be again used as above described. In burning the spent materials in order to remove the sulphur, it is found that muriate of ammonia distils over and then separates from the sulphurous acid before it reaches the vitriol chamber; this is collected in suitable vessels of ordinary construction, and applied to any known purposes.

676.—JOHN LOADER, of Upper Clifton Street, Worship Square, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" Provisional protection only obtained. Dated March 6, 1869.

This improved engine is constructed as follows:—Through a cylinder a central shaft or axis is passed, having a crank-pin or eccentric formed on or carried thereby, and upon the crank-pin or eccentric is fitted a disc which is capable of revolving thereon, and the periphery of which fits against the inside of the cylinder. In the cylinder a slot is cut, in which a stop or abutment slides. This stop or abutment may be in a line radiating from the centre of the cylinder or inclined thereto, and such stop or abutment is connected to the disc or piston by a stud or pin, which is received into a suitable hole formed for it in the disc or piston, or it may be connected thereto in other convenient manner.

690.—WILLIAM ARMAND GILBEE, trading under the style of L. de Fontainemoreau, of 4, South Street, Finsbury, in the co. of Middlesex, patent agent, for "*An improved apparatus for raising water.*" A communication. Patent dated March 8, 1869.

The apparatus or pump consists of a wheel furnished with one or more hollow cylinders closed or not to the water, and with a number of paddles or arms.

It is suspended on its shaft, and enclosed between three walls or partitions of masonry, or other suitable material, and separates directly the up water from the down water when no valve is placed before the wheel on the side of the up water. In turning on its shaft the circumference of its outer cylinder forms the moveable side or partition of a pump body; the three other sides formed by the masonry are fixed, thus forming a pump with rotary pistons, which, without pipes, valves, or other accessories, raises the down water into the up water without any unnecessary elevation, whatever be the levels and the speed of the wheel.

711.—James John Shedlock of King's Road, Camden Town, in the co. of Middlesex, engineer, for "*Improvements in wet gas-meters.*" Patent dated March 9, 1869.

This invention relates to the mode or method by which the water level is maintained at the proper height, thereby ensuring correct registration. For this purpose a tube is provided having a partition fixed diagonally in the interior, and two apertures made therein, one on either side of the partitions. The tube is held vertically at its ends by two stuffing-boxes fixed on the upper and lower parts of the chamber in which the tube is placed. The upper end of the tube communicates with the square front of the meter, and the lower end with the overflow or waste-water chamber. The lower part of the chamber containing the tube communicates with the drum-case below the water line, and the upper part of the tube-chamber with the gas-passage from the inlet-pipe. The float carrying the inlet-valve is adjusted to the proper height by means of a nut fixed in the lower part, and a screw, on the upper part of which is fixed the valve. The index has motion transmitted to it by the ordinary method.

712.—James John Shedlock, of King's Road, Camden Town, in the co. of Middlesex, engineer, for "*Improvements in dry gas-meters.*" Patent dated March 9, 1869.

This invention relates to improvements in dry gas-meters, the diaphragms of which are so constructed that when distended they take the form of truncated pyramids, the sides of which are leather, or other like flexible material. Metal frames forming the lower bases, and plates of metal forming the upper bases, are securely attached to the flexible sides. Double-hinge joints connect the plates of metal forming the upper bases to vertical rods, the lower ends of which work in studs fixed in the bottom of the meter, and the upper ends are supported by and work in stuffing-boxes attached to the valve-plate. The valve-plate is fitted with as many valves as there are diaphragms, each valve having two inlet ports and one outlet port. The inlet-pipes are cast in one piece with the valves, corresponding holes being in the valve-plate to communicate with either side of the diaphragms. The outlet-pipes are also cast in one piece, and communicate direct with the outlet-pipe of the meter. The valve-covers receive their motion through connecting-rods, one end of which is attached to each valve-cover, and the other end to a crank driven by arms or levers fixed to the other end of the vertical rods. The registering apparatus is driven from the crank-shaft by means of a worm and wheel.

728.—Theobold Obach, of Manchester, in the co. of Lancaster, engineer, for "*Improvements in fuel economizers, parts of which are applicable to joining and fixing pipes for other purposes.*" Patent dated March 9, 1869.

In fuel economizers, which consist of a number of pipes connected together at both ends, it is very important, in case of repairs being required, that means should be provided for readily taking out one or more of the pipes without disturbing the other parts.

The object of this invention is in the first place so to connect these pipes into their sockets that so long as they are put in their proper position they may make a perfectly tight joint, but when required they may be readily detached and lifted out of their places. This is accomplished as follows:—Upon the pipe, and near the end thereof, are formed two or more studs or projections. The socket into which the pipe is to be fixed is provided with two or more recesses corresponding to the projections on the pipe, so that these recesses allow the projections on the pipe to pass when the pipe is inserted into the socket. These recesses open into a groove or grooves, and a shoulder or face is provided in the socket corresponding to the face or end of the tube. When the tube is placed in the socket the recesses allow the projections to pass, the tube is then turned partially round, thus bringing the projections into the grooves which form portions of a helix in such a direction as to cause the end of the pipe to be drawn close up to the face in the socket, so as to make a tight joint. Where it is found necessary to take the pipe out it will only have to be turned round in the reverse direction. This mode of attaching pipes to their sockets is also applicable to other purposes besides fuel economizers, and when applied to fuel economizers, in order still further to facilitate the putting in and taking out of the pipes, there is formed upon the other end of the pipe, the joint of which may be made by a flange or other means, projections or recesses arranged to receive a tool, by means of which the pipe may be turned and lifted out of its place, and it is preferred to make these recesses or projections also indicate the direction in which the pipe should be turned. It is preferred to put a shoulder on the pipe to cover the recesses when the pipe is fitted into its place, or the joint might be made by means of a shoulder on the pipe abutting against the face of the socket. In the second place the invention consists in an improved means of driving the scrapers of fuel economizers. This consists of a revolving crank or eccentric, which, by acting by means of a connecting-rod on a crank of longer throw, imparts thereto a reciprocating motion, and this motion being imparted to a toothed segment gearing into a wheel on a shaft, which also carries pulleys, round which work chains connected to the scrapers, gives the necessary up-and-down or to-and-fro motion.

In the next place my invention consists in an improved form of scrapers for clearing the pipes of fuel economizers from soot. These scrapers are carried by a frame which is suitably guided against some of the outer pipes, and they are of such a form that the scraping edges embrace the pipe in the form of a portion of a helix. These scrapers are not connected to the frame rigidly, but by means of a hinge joint, in order that if the scraper-meets with any fixed obstruction it may simply be pushed out round this joint as a centre. The centres or hinge joints are so placed that the weight of the scrapers keeps them in contact with the pipe.

730.—William Robert Lake, of 8, Southampton Buildings, Chancery Lane in the co. of Middlesex, consulting engineer, for "*Improvements in devices for rendering gas-burners self-lighting.*" A communication. Patent dated March 10, 1869.

This invention consists—1. In combining a coil of platinum wire or its equivalent with a gas-burner in such a manner that it will cause the re-ignition of the gas if the latter should be extinguished without shutting off the flow. 2. In supporting the said platinum coil or its equivalent upon a ring, which may be cast upon the wire, or secured thereto in any other manner, and is adapted to fit around the gas tip or burner. 3. In combining a cap or hood with a self-lighting gas-burner or self-lighting attachment, substantially as hereinafter described. 4. In combining with a platinum coil or equivalent device to effect or assist the ignition of the gas, a gas-cock, key, or burner which will permit a slight leakage of gas (while the main supply is turned off) in order that a small taper flame may be maintained, the contact of which flame with the wire coil or its equivalent, or its proximity thereto, will prevent the cooling of the said coil. 5. In a tip of non-corrosive material employed in a self-lighting gas-burner, or a burner adapted to maintain a constant flame of small size when the illuminating or principal flame is extinguished or reduced, whether the small flame be independent of the main flame or otherwise.

APPLICATIONS FOR LETTERS PATENT.

556.—William Bradshaw Leachman, of Leeds, in the co. of York, for "*Improvements in hydraulic apparatus for raising and forcing water.*" Feb. 25, 1870.

557.—William Robert Lake, of Southampton Buildings, London, consulting engineer, for "*An improved method of and apparatus for producing and utilizing a fall of water.*" A communication. Feb. 25, 1870.

565.—James John Holden, of Mark Lane, in the City of London, and Bermondsey, in the co. of Surrey, engineer, for "*Improvements in apparatus for charging and discharging gas-retorts, and for other similar purposes.*" Feb. 25, 1870.

577.—John Randall Mann, of East Cowes, in the Isle of Wight, for "*Improvements in and connected with water-closets and other sanitary appliances.*" Feb. 26, 1870.

580.—Alexandre Bobrownicki, of Paris, civil engineer, and Alfred Didier Marie Mesnard, Vicomte de Chousy, of Commune d'Orchaise, in the department of Loire-et-Cher, both in the empire of France, for "*An improved process for converting human excrement into fuel and manure.*" Feb. 26, 1870.

593.—Thomas Clayton, mechanic, and John Taylor, merchant, both of Manchester, in the co. of Lancaster, for "*Improvements in apparatus employed to produce inflammable gas from mineral or other oils, modifications of which apparatus are also applicable to be employed in the heating of water or the generation of steam.*" Feb. 28, 1870.

596.—Marmaduke Wilkin, of 2, St. James's Terrace, Paddington, in the co. of Middlesex, gentleman, John Clark, of 8, Belmont Terrace, Kensington, in the co. of Middlesex, engineer, and Adam Scott, of 3, Blomfield Crescent, Paddington, in the co. of Middlesex, gentleman, for "*Improvements in subdividing particles of water and other fluids, and applying the same to sanitary and other purposes.*" March 1, 1870.

607.—David Forbes, consulting engineer, of York Place, Portman Square, and Astley Paston Price, consulting chemist, of 47, Lincoln's Inn Fields, both in the co. of Middlesex, for "*Improvements in the treatment of sewage and in the production of manures.*" March 2, 1870.

608.—Thomas Brown, of the firm of Thomas Brown and Co., of 96, Newgate Street, in the City of London, civil engineer, for "*An improved apparatus for feeding or supplying steam-generators with water, which said apparatus is applicable to the raising and forcing of water and other liquids.*" A communication. March 2, 1870.

630.—James Conyers Morrell, of Leyland, in the co. of Lancaster, for "*Improvements in apparatus applicable to the treatment of towns and domestic refuse for sanitary purposes.*" March 3, 1870.

631.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in fluid-meters.*" A communication. March 3, 1870.

643.—Edward John Cowling Welch, of Eden Works, Hampstead Road, in the co. of Middlesex, for "*Improved apparatus for using the lime-light for theatrical representations and other purposes.*" March 4, 1870.

655.—George Elliot, of 23, Great George Street, in the co. of Middlesex, M.P. for North Durham, for "*Improved means of ventilating and reducing the temperature of rooms or apartments in vessels, buildings, and other structures.*" March 5, 1870.

657.—Edwin Bray, of Fulneck, John Crosby Hargreaves, of Hunslet, and Francis Henry Stubbs, of Hunslet, near Leeds, in the co. of York, for "*Improvements in apparatus for burning and consuming smoke.*" March 5, 1870.

682.—Robert Arthur Wiffen, of Romford, in the co. of Essex, plumber, for "*A new construction of tapping-cock or apparatus for drawing liquids from casks or other vessels.*" March 8, 1870.

685.—William Cowan, Alexander Donaldson, and John Sandilands, all of the city of Edinburgh, gas-meter manufacturers, for "*Improvements in dry gas-meters.*" March 8, 1870.

689.—George Preston and John Prestige, both of Deptford, in the co. of Kent, engineers, for "*An improved apparatus for preventing waste of water in dwellings and other places where the constant supply service is laid on.*" March 8, 1870.

706.—Charles Aston Winder, of Sheffield, in the co. of York, engineer, for "*An improved apparatus for use in drawing and forcing air, water, and other fluids.*" March 10, 1870.

713.—John James Lundy, of Leith, near Edinburgh, in the co. of Mid Lothian, N.B., colour, paint, varnish, and chemical manufacturer, for "*Improvements in effecting the decolorization, deodorization, and purification of foul and waste waters, of sewage, and of supernatant sewage water.*" March 10, 1870.

GRANTS OF PROVISIONAL PROTECTION.

340.—Heinrich Witthöft, of Copenhagen, in the kingdom of Denmark, for "*Improvements in gas-burners.*" Feb. 5, 1870.

393.—James Thomson, of 18, Whittington Road, Peckham, and William Thomson, of 22, Carlton Square, Peckham, for "*Improvements in ventilation of chimneys and apartments.*" Feb. 10, 1870.

411.—James Smart, of Stratford, in the co. of Essex, engineer, for "*Improvements in slide-valves.*" Feb. 11, 1870.

424.—Alexander Prince, of 4, Trafalgar Square, Charing Cross, in the co. of Middlesex, for "*Improvements in generating gas from petroleum and other oleaginous substances, and in the apparatus to be employed therein.*" A communication. Feb. 12, 1870.

433.—William Whieldon and John Beck, both of 190, Westminster Bridge Road, in the co. of Surrey, engineers, for "*Improvements in cocks and valves, and in packing for the same.*" Feb. 14, 1870.

436.—John Weems and William Weems, of Johnstone, in the co. of Renfrew, N.B., engineers, for "*Improvements in the manufacture or production of metallic pipes and sheets, and in making joints therefor.*" Feb. 15, 1870.

463.—Sigismund Leoni, of 34, St. Paul Street, New North Road, in the co. of Middlesex, manufacturer, for "*Improvements in apparatus for cooking, heating, and lighting by gas.*" Feb. 17, 1870.

464.—Laurent Lucon and Zoé Peigné Widow Kern, of Nantes, and of 37, Boulevard Bonne-Nouvelle, Paris, in the empire of France, for "*An improved horizontal pump.*" Feb. 17, 1870.

480.—Clement Heaton, of Garrick Street, Covent Garden, in the co. of Middlesex, glass painter, for "*Improvements in the means of preventing the bursting of water-pipes by the action of frost.*" Feb. 18, 1870.

481.—Richard Hunt, of Scarborough, in the co. of York, hotel-keeper, for "*An improved apparatus or receptacle for storing and for withdrawing wine or other liquids, part of which apparatus is also applicable wherever a tap may be required.*" Feb. 18, 1870.

485.—Isham Baggs, of High Holborn, in the co. of Middlesex, for "*Improvements in the manufacture of the carbonates of ammonia.*" Feb. 18, 1870.

498.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the obtainment or production of oxygen gas.*" A communication. Feb. 19, 1870.

504.—William Edwin Heath, of 23, Camden Road, in the co. of Middlesex, gas engineer, for "*Improvements in gas-pressure governors.*" Feb. 21, 1870.

506.—John Leopard, of Hassock's Station, Hurstpierpoint, in the co. of Sussex, for "*Improvements in treating and filtering sewage, and in apparatus to be employed for these purposes.*" Feb. 21, 1870.

510.—Frank Clarke Hills, of the Chemical Works, Deptford, in the co. of Kent, manufacturing chemist, for "*Improvements in the manufacture of gas,*

and in obtaining residual products from such manufacture, and in apparatus to be used in such manufacture." Feb. 21, 1870.

556.—WILLIAM BRADSHAW LEACHMAN, of Leeds, in the co. of York, for "*Improvements in hydraulic apparatus for raising and forcing water.*" Feb. 25, 1870.

557.—WILLIAM ROBERT LAKE, of Southampton Buildings, London, consulting engineer, for "*An improved method of and apparatus for producing and utilizing a fall of water.*" A communication. Feb. 25, 1870.

565.—JAMES JOHN HOLDEN, of Mark Lane, in the City of London, and Bermondsey, in the co. of Surrey, engineer, for "*Improvements in apparatus for charging and discharging gas-retorts, and for other similar purposes.*" Feb. 25, 1870.

577.—JOHN RANDALL MANN, of East Cowes, in the Isle of Wight, for "*Improvements in and connected with water-closets and other sanitary appliances.*" Feb. 26, 1870.

593.—THOMAS CLAYTON, mechanic, and JOHN TAYLOR, merchant, both of Manchester, in the co. of Lancaster, for "*Improvements in apparatus employed to produce inflammable gas from mineral or other oils, modifications of which apparatus are also applicable to be employed in the heating of water or the generation of steam.*" Feb. 28, 1870.

596.—MARMADUKE WILKIN, of 2, St. James's Terrace, Paddington, in the co. of Middlesex, gentleman, JOHN CLARK, of 8, Belmont Terrace, Kensington, in the co. of Middlesex, engineer, and ADAM SCOTT, of 3, Blomfield Crescent, Paddington, in the co. of Middlesex, gentleman, for "*Improvements in subdividing particles of water and other fluids, and applying the same to sanitary and other purposes.*" March 1, 1870.

608.—THOMAS BROWN, of the firm of Thomas Brown and Co., of 96, Newgate Street, in the City of London, civil engineer, for "*An improved apparatus for feeding or supplying steam-generators with water, which said apparatus is applicable to the raising and forcing of water and other liquids.*" A communication. March 2, 1870.

630.—JAMES CONYERS MORRELL, of Leyland, in the co. of Lancaster, for "*Improvements in apparatus applicable to the treatment of towns and domestic refuse for sanitary purposes.*" March 3, 1870.

NOTICES TO PROCEED.

3081.—CHARLES ANTHONY OPPERBERG, of Finsbury, in the co. of Middlesex, for "*Improvements in filters and filtering apparatus.*" A communication. Oct. 23, 1869.

3146.—ROBERT JOHN EVERETT, of West Ham, in the co. of Essex, for "*An improved process for the manufacture of salts of ammonia from ammoniacal gas liquor.*" Oct. 30, 1869.

3177.—WILLIAM CONNELL, of Glasgow, in the co. of Lanark, N.B., plumber and brassfounder, for "*Improvements in water-closets.*" Nov. 2, 1869.

3186.—HENRY JAMES HOGG KING, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in apparatus for measuring, indicating, and regulating the flow or passage of liquids.*" Nov. 3, 1869.

3198.—MATTHEW WILSON, of 15, Wellington Street, in the borough of Southwark, in the co. of Surrey, gentleman, for "*Improvements in sink-traps.*" Nov. 4, 1869.

474.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in apparatus for lighting, applicable also for signalling purposes.*" A communication. Feb. 17, 1870.

510.—FRANK CLARKE HILLS, of the Chemical Works, Deptford, in the co. of Kent, manufacturing chemist, for "*Improvements in the manufacture of gas, and in obtaining residual products from suchmanufacture, and in apparatus to be used in such manufacture.*" Feb. 21, 1870.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

458.—JOHN HENRY JOHNSON, "*Improvements in the application of certain hydrocarbons to the attainment of light and heat, and in the apparatus or means employed therein.*" Feb. 20, 1867.

463.—GEORGE HESELTINE, "*An improved mode of and apparatus for letting on and shutting off gas and igniting the same.*" Feb. 20, 1867.

479.—WILLIAM HALE, "*Improvements in propelling vessels, which improvements are also applicable to raising or forcing fluids.*" Feb. 21, 1867.

495.—WILLIAM EDWIN HEATH, "*Improvements in gas-pressure governors.*" Feb. 22, 1867.

499.—ARTHUR KINDER and WILLIAM BARNES KINSEY, "*Improvements in gas-engines.*" Feb. 23, 1867.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

512.—ROBERT WILLIAM THOMSON, "*Improvements in obtaining and applying motive power, which improvements, or parts thereof, are applicable to raising, forcing, and measuring fluids.*" Feb. 24, 1863.

Advertisements.

WANTED, by a young Man, a situation at the GAS-FITTING. Nine years experience; thoroughly acquainted with all branches of the trade. First-class reference as to ability and character. No objection to go abroad.
Address CHARLES SHINTON, Grayhound Inn, Redditch, WORCESTERSHIRE.

TO GAS MAKERS.

WANTED, on the 21st of April next, a steady, sober, industrious Workman, to take the ENTIRE MANAGEMENT of the Spilsby Gas-Works. Wages 22s. per week, with house, large garden, gas, and coal free.
Apply to THOS. THIMBLEBY, Secretary to said Company. Spilsby, Feb. 17, 1870.

GAS MANAGER.

WANTED, for a small work, a Person who thoroughly understands GAS-MAKING. He will be required to take the meters, and make out and collect the customers accounts, and give security to the extent of £200.
Applications, with testimonials, stating salary required, to be forwarded to Messrs. KNOWLES AND SON, Solicitors, Wellington, SALOP.

TO GAS COMPANIES.

WANTED, by a young Man, a Situation Fully understands fixing and inspecting meters, service laying, photometer testing, collecting, and the general routine of a Gas-Work. First-class testimonials. Five years experience.
Address F. B., care of Mr. Weller, 60, Newington Causeway, LONDON.

WANTED, a good and steady Stoker for a Gas-Work about 40 miles out of London. Wages 24s. per week.
Address to "Gas-Work," care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Working Manager of a Gas-Work, or as Foreman of Fitters and Inspector, &c. Aged 34. Can give good reference.
Address F. M., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO ENGINE DRIVERS & FITTERS.

REQUIRED at once, the services of a Man for the Hemel Hempstead Water-Works. As only one man is kept, he will have to attend to the engine, pumping, service laying, &c. Wages 24s. per week.
Apply by letter, with testimonials, to W. STOCKEN, Hemel Hempstead, HERTS, on or before the 17th inst.

TO GAS COMPANIES.

A Practical Manager is open to a re- engagement. Aged 32. Some years experience in similar situations, at home and abroad, in works where amount made is about 12,000,000. Well recommended.
Address R. WILKIE, 1, Italian Walk, VAUXHALL, S.

GAS CHANDELIERS, GAS-FITTINGS, PLUMBERS AND BELL-HANGERS WORK, &c.

ADVERTISER, having an extensive connexion in Ireland amongst Gas Companies, Gas-Fitters, Plumbers, Ironmongers, &c., will be glad to communicate with first-class houses in the above branches who may already have a connexion in Ireland, or be disposed to open one.
Address J. FURNISS, 3, Foumer Street, DUBLIN.

TO GAS-METER MAKERS.

WANTED, some first-class Wet and Dry METER MAKERS.
Apply at the IMPERIAL METER-WORKS, King's Road, CAMDEN TOWN.

PURIFIERS FOR SALE.

A Set of Four Purifiers, 8 ft. by 5 ft., with centre-valve, connexions, and lifting apparatus complete, in good working condition.
Apply to the MANAGER, Gas-Works, BRIGHOUSE.

TO BE SOLD CHEAP, on the works of the British Gaslight Company, Limited, Norwich, Two STATION-GOVERNORS, to pass 30,000 cubic feet per hour each.
One 10-in. PILLAR VALVE, fluted column, and engraved index-plate.
One 8-in. Ditto.
Various 3-in. Bends and Connexions.
For prices and particulars apply to C. TADMAN, Superintendent, NORWICH.
Feb. 10, 1870.

TO GAS ENGINEERS, FURNISHING IRONMONGERS, AND OTHERS.

TO BE DISPOSED OF, by Private Contract, the BUSINESS of a Gas Engineer, thoroughly well established, and with a high reputation. The premises are situate in one of the leading thoroughfares of the metropolis, and comprise spacious Shops with Show-Rooms having a large frontage to the street. Gross profits about £2000 per annum. The plant and stock in trade can be taken either at an agreed sum or a valuation. Easy terms can be arranged for payment.
For further particulars, apply to Messrs. FULLER, HORSEY, SON, AND CO., 11, BILLITER SQUARE, E.C.

CARRICK-ON-SUIR GAS-WORKS, COUNTY TIPPERARY, IRELAND.

THE Directors of the Carrick-on-Suir Gas Company, Limited, are prepared to receive TENDERS for the LEASE of the above WORKS.
Tenancy to commence October, 1870.
Tenders to be lodged with the undersigned on or before the 1st of June, 1870.
For further particulars, apply to J. ERNEST GRUBB, Secretary, CARRICK-ON-SUIR.
March 9, 1870.

COKE BREEZE.

THE Directors of the Imperial Gaslight and Coke Company are ready to receive TENDERS from parties willing to purchase the BREEZE made at their several works—viz., at York Road, King's Cross; Great Cambridge Street, Hackney Road; and Sands End, Fulham, for One Year from the 31st inst.
Forms of tender may be obtained on application to the SECRETARY, at the Office, 33, John Street, BEDFORD ROW, to whom the tenders must be sent on or before Tuesday, the 22nd inst.
The Directors will not be bound to accept the highest or any tender.
March 11, 1870.

STREET-MAINS.

THE Camborne Gas Company are pre- pared to receive TENDERS for the supply of 1550 yards of 7-in., and 600 yards of 6-in. MAIN-PIPES, delivered at the Camborne Railway Station. Carriage by rail from nearest seaport (Hayle) wou d be 2s. 6d. per ton.
Tenders to be sent in on or before the 22nd inst.
The lowest or any tender not necessarily accepted.
W. BAILEY, Secretary and Manager.
Camborne, Cornwall, March 10, 1870.

ST. MARY CHURCH LOCAL BOARD, DEVON.

TENDERS are invited for the supply of about 600 tons of GAS COALS, to be delivered either at the Torre Station of the South Devon Railway, or at Dartmouth: 200 tons to be delivered the second week in April, and 400 tons the end of September or beginning of October. State quality and quantity of gas and coke produced, and price of coal per ton.
The lowest or any tender will not necessarily be accepted.
Address CLERK of the Gas-Works, St. Mary Church, DEVON, endorsed "Tender for Gas Coals."

YSTALYFERA GAS COMPANY, LIMITED.

THE above Company are prepared to receive TENDERS for the erection, at their works at Ystalyfera, of an additional set of Five Retorts, Oven, Hydraulic Main, Ascension-pipes, &c., complete.
The general conditions of the contract to be obtained by application to the Secretary, Mr. E. C. FISHER, Gas-Works, Ystalyfera, near SWANSEA.
March 4, 1870.

WATER-WORKS FITTINGS,
SLUICE COCKS, FIRE COCKS,
METERS, STEAM FITTINGS,
GAS & HOT-WATER VALVES, &c.,
Of First-class Materials and Workmanship.

BECK & CO., Limited,
BRASSFOUNDERS & HYDRAULIC ENGINEERS,
GREAT SUFFOLK STREET, SOUTHWARK, S.E.
Illustrated Catalogues on application.

C. & W. WALKERS'
WOOD SIEVES FOR PURIFIERS.

These justly celebrated Sieves, with bevel bars and hard-wood side frames, have been extensively made by Messrs. Walker for over seven years, and their advantages and durability are fully established. Messrs. Walker make them in very large quantities, having mills and machinery specially laid out for them, producing them at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
8, FINSBURY CIRCUS, LONDON, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

PRICE'S PATENT COKE & COAL BARROW,

effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Gas-Works, HAMPTON WICK.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 17 6	3 18 0	3 13 6	3 10 0	3 15 0
1¼ and 2-inch Socket-pipes	7 0 0	5 15 0	5 10 0	6 0 0	7 0 0
2½ and 3-inch ditto	6 10 0	5 5 0	5 0 0	5 15 0	6 10 0
4 and 5-inch ditto	6 0 0	4 15 0	4 10 0	5 5 0	6 0 0
6 inches and upwards ditto	5 15 0	4 5 0	4 0 0	5 0 0	5 15 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 5 0	5 0 0	5 10 0
Ditto, 2nd ditto, cold ditto	6 10 0	—	—	—	6 10 0
Tank-plates, ¼ thick and above	6 0 0	5 0 0	4 15 0	5 10 0	6 0 0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1 8	1 1	0 10	0 7	0 5	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 6	1 1	0 9	0 8
Long Screws, from 12 in. upwards	4 0	2 3	2 0	1 6	1 2	0 11
Bends and Springs	4 3	2 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3 2	2 3	1 9	1 3	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 9
Crosses, ditto, equal or reducing	4 9	3 6	3 0	2 3	1 9	1 6
Iron Cocks	20 9	13 0	10 0	7 3	5 0	3 8
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4½
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.

Newcastle—Unscreened:—	Per Ton. 6s. 6d.
Haswells, Nettlesworth Primrose, and South Pelaw	
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	6 9
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	15 0
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel:—	Per Ton.	*Scotch Cannel:*—	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith	48s. 2d	Pirnie, or Methill	17s. 6d
Muirkirk	27 0	Lothian's Cannel (f.o.b. at Leith)	26 0
Kirkness, best (at Burntisland)	28 6	Bo'ness Cannel (at Bo'ness)	19 0
Capeldrae, 1st quality (at ditto)	28 6	Myles' Cannel	23 6
Ditto, 2nd ditto (at ditto)	18 6	Kinnall (at Bo'ness)	17 6
Cowdenbeath	12 0	Lochore Parrot (at Burntisland)	26 0
Lesmahago (at Glasgow)	31 6	Lanemark (at Glasgow)	16 0
Ditto (at Granton)	32 6	Elphinstone Tower (at Leith)	20 0
Arniston	27 6	Coppa Cannel (on rails at Birkenhead)	13 6
Wemyss, f.o.b.	22 6	Ditto ditto (ditto at Connah's Quay)	13 0
Haywood, Wilsontown (at Granton)	23 0		

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:*—	Per Keel.
Chatham and Rochester	5s. 9d. to 6s. 3d	Barcelona	£18 10s. to £19 0s
Cork	9 6	Bordeaux	12 0
Dover, Folkestone, and Ramsgate	6 9	Boulogne and Calais	8 0
Dublin	10 0	Cadiz	12 10
Exeter Quay	9 6	Cronstadt	10 0
Ipswich	5 0	Copenhagen	7 15
London (from Leith)	8 6	Genoa	18 0
London (Pool)	5 9	Hamburg	8 10
Lowestoft and Yarmouth	4 6	Havre de Grace	10 0
Portsmouth & Southampton	6s. 6d. to 7 0	Leghorn	17 10
Plymouth	8 6	Lisbon	10 10
Shoreham	7 0	Rotterdam	8 0
Whitstable	5s. 9d. to 7 0	Stettin	9 10
Weymouth	8 0	Trieste	18 0
		Venice	20 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	2 15 0
Ingham's ditto (at Wortley), per 1600	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarns, per cwt.	1 0 0

CHEMICAL, MINERAL, AND METAL MARKETS.

[*From J. Berger Spence and Co.'s Weekly Report.*]

The early part of last week was more fruitful in inquiry than actual business, mainly for the Mediterranean; and although from the tone of the various solicitations for prices there appeared to be some considerable orders in the market, it had only reference to one parcel of consequence for Ash and Caustic, which was closed respectively at 1⅞d. and £13. These numerous inquiries, eliciting so many quotations for one shipment, have not the desired effect in securing low values, as producers naturally conclude that the trade is brisker than it really is, and thus hold out for firm prices. In other Chemicals there has been a fair market, chiefly in the staple articles of the trade, and prices may be said to rule in most cases in favour of the manufacturer. In Minerals there is not much doing, contracts are better supplied, and the consignments have been more regular. There is no improvement in the Metal trade; transactions are confined to actual requirements, which remain of a limited character. Scotch Pig Iron has had several changes during the week, and closes easier. Cleveland stocks show a reduction, and makers in consequence remain firm at quotations. In Copper the nominal reduction made by the smelters, and the alteration in the discount allowed by them, has quite stopped trade for the moment in this metal. Tin is firm, with a moderate business doing. Lead steady, and in fair inquiry. Spelter is easier, and buyers are looking for lower prices. Soda: in ash there is a decided firmness displayed, and 1⅛d. per degree is now the lowest that qualities such as B.A.W. sell at. Caustic Soda, being also well sold forward, is quoted firm at £13 for 60 per cent. Crystals rather quiet at £4. Bicarbonate, at £9, sells slowly. Nitrate of Soda, after touching £17 during the week on the spot, is again declining, and closes at £16 10s. to £17. Potash: muriate has changed hands at £8 for 80 per cent. f.o.b., and can be bought at from that to £8 5s. per ton. Saltpetre: stocks light, and prices rule from 23s. 6d. to 26s. 6d. English Refined, 27s. 6d. Alum: home orders have been plentiful, and there is a considerably increased consumption. Loose lump sells at £6 5s., and in export barrels at £7; ground, £7; London prices 10s. per ton extra. Ammonia: sulphate is in more request, and prices are very firm at £16 10s. for best grey and white, and £15 10s. for brown; muriate is somewhat scarce. Copperas: there is more activity in green and rusty, at £2 12s. 6d.; dry is in request at £2 12s. 6d. Arsenic is quoted at £7 to £7 5s. per ton for fine powdered. Pyrites is firm at previous prices; calcined still obtains 44s. R.C. Lime: phosphate is rather quiet, though price is firm; super-phosphate quoted at £4 to £4 5s.; bleaching powder is steady at £7 10s. to £8 for 35 per cent. Pitch: hardly any business done, prices being too low to induce producers to sell. Benzole does not obtain any advance, and can be had at 2s. 6d. per gallon for 30 per cent. Manganese is inactive, and considerable quantities are upon the market. Iron Ore: some heavy contracts have been made in oolitic at high prices; hematite firm. Guano: best Peruvian realizes £13 7s. 6d. to £13 10s. Magnesia: sulphate firm at £4 10s. to £5 per ton.

Metals.—Iron: Scotch pig iron steady, at 54s. 6d. to 54s. 9½d.; Cleveland, firm, at 49s. for forge 4, to 53s. 6d. for No. 1. Welsh bars, £6 10s. to £6 15s.; Staffordshire bars, £7 10s. to £8. Gas-tubes, 60 to 67½ per cent. off list; boiler-tubes, 40 to 42½ per cent. Copper: unsettled; English tough ingot, £70 to £71; Chili slab, £66 10s. to £66 15s. Tin: in fair demand; English ingot, £122 to £123; Straits, £119 10s. to £120. Lead: firm; P. G. best English soft pig lead, £19. Spelter: easier; English, £19 10s. to £20. Silesian, special brands, £19 2s. 6d. to £19 7s. 6d.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	12 — 12½
1000	20	Do., preference	20 0 0	10 0 0	23 — 24
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 10 0	5¾ — 6
10000	5	Do., third issue	4 0 0	4 10 0	4¼ — 5
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	30 — 31
12000	50	*Chartered*	50 0 0	6 0 0	61 — 62
6000	50	Do.	45 0 0	6 0 0	54 — 55
30000	10	Do., preference	1 0 0	5 0 0	1¼ — 1⅝
10000	20	*City of London*, A shares	20 0 0	9 0 0	25 — 26
10000	10	Do., B shares	10 0 0	4 0 0	6⅞ — 7
9629	10	Do., new shares	10 0 0	9 0 0	12¼ — 13
17490	25	*Commercial*	25 0 0	10 0 0	40 — 41
20000	20	Continental Union	20 0 0	8 0 0	28 — 29
10000	10	Do., new	5 0 0	..	8¼ — 9
5213	20	Do., preference	20 0 0	7 0 0	24 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	15¼ — 16
5000	10	Do., preference	10 0 0	6 0 0	11 — 11¼
10000	10	Do., new shares	10 0 0	7 0 0	11¼ — 12
4000	50	*Equitable*	50 0 0	10 0 0	80 — 82
4000	25	Do., new shares	25 0 0	10 0 0	40 — 41
23405	10	European (Limited)	10 0 0	11 0 0	17 — 18
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	9 — 9¼
20000	10	*Great Central Gas Consumers*	10 0 0	..	16¼ — 17
5000	10	Hong Kong (Limited)	10 0 0	7 0 0	11 — 12
26000	50	*Imperial*	50 0 0	10 0 0	82 — 82½
26000	10	Do., new shares	7 0 0	10 0 0	12¼ — 13
26000	12½	Do., new shares	12 10 0	7 0 0	14 — 14¼
1300	100	Do., bonds	£100	10 0 0	175 —180
28000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	18 5 0	132 —134
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	56 — 58
3000	10	Do.	10 0 0	5 0 0	7 — 8
3000	20	Do.	15 0 0	7 10 0	15 — 16
7133	50	*London*	50 0 0	10 0 0	80 — 81
5610	25	Do., 1st preference	25 0 0	6 0 0	26 — 27
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
15000	5	Nietheroy, Brazil (Limited)	5 0 0	3 10 0	3¼ — 4
6000	5	Malta and Mediterranean (Limited)	5 0 0	7 0 0	4¼ — 5¼
30000	5	Do., preference	5 0 0	10 0 0	8 — 8¼
30000	5	Oriental (Calcutta)	1 10 0	10 0 0	3 — 3¼
10000	5	Do., new shares	5 0 0	nil.	2 — 2½
12500	10	Ottoman (Limited)	10 0 0	7 10 0	10 — 10¼
27000	20	Parà (Limited)	20 0 0	10 0 0	31¼ — 32
3600	100	*Phœniz*	40 0 0	7 10 0	42½ — 43
144000	Sk.	Do., new	100 0 0	5 0 0	75—76 xd.
5000	20	Do.	20 0 0	10 0 0	26 — 27
	20	*Ratcliff*	20 0 0	10 0 0	28½ — 29
6959	5	Rio de Janeiro (Limited)	5 0 0	10 0 0	
2000	5	Singapore (Limited)	5 0 0	5 0 0	
4000	50	Do., preference	5 0 0	7 10 0	
4000	12½	Shanghai *South Metropolitan*	50 0 0	10 0 0	80 — 82
20000	12½	Do.	12 10 0	10 0 0	20 — 20¼
15000	10	Do., new shares	1 0 0	10 0 0	3 — 3¼
10000	10	*Surrey Consumers*	10 0 0	10 0 0	15½ — 16
9000	4	Do., new	6 0 0	10 0 0	9 — 9¼
10000	10	United General (Limerick)	4 0 0	5 0 0	2¼ — 3
1500	10	*Victoria Docks*	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	10 0 0	7 10 0	
20000	10	Do.	5 0 0	7 10 0	
10000	10	Western (Limited) A shares	10 0 0	10 0 0	16 — 16¼
10000	10	Do., B shares	8 0 0	10 0 0	13 — 13½
20000	10	Do., C shares	8 0 0	10 0 0	13 — 13½
16000	5	Do., D shares	1 0 0	10 0 0	2¼ — 3
551	10	*West Ham*	5 0 0	7 10 0	7 — 7¼
520	10	West London Junction (Limited)	10 0 0	6 0 0	
		Do., preference	10 0 0	6 0 0	

THE

DUKE OF HAMILTON'S

LESMAHAGOW

CANNEL COAL.

LESSEES:

THE NITSHILL & LESMAHAGOW COAL COMPANY.

OFFICE:

37, ST. VINCENT PLACE,

GLASGOW,

Where all communications are requested to be addressed.

SURREY CONSUMERS GAS COMPANY.

NOTICE is hereby given that the HALF-YEARLY ORDINARY GENERAL MEETING of the Company will be held at the Bridge House Hotel, London Bridge, on THURSDAY, the 14th day of April next, at Three o'clock in the afternoon precisely, to receive the Directors Report for the half year ending the 31st of December last, to declare a Dividend, and to elect Two Directors in the room of Mr. Thomas Pocock and Lieut.-Colonel Beresford, M.P., who offer themselves for re-election, and of One Auditor in the room of Mr. William Westcott, who also offers himself for re-election.

The Books for the Transfer of Shares will be closed on Saturday, the 2nd of April, until the day of Meeting.

W. P. BODDY, Secretary.

Rotherhithe, March 1, 1870.

THE CAGLIARI GAS & WATER COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of the SHAREHOLDERS in this Company will be held at the Offices of the Company, No. 2, Moorgate Street, in the City of London, on FRIDAY, the 25th day of March inst., at half-past Three o'clock, to receive the Report of the Directors, and for the general business of the Company.

The Transfer Books will be closed from the 19th to the 26th day of March inclusive.

At the conclusion of the Ordinary Meeting, an Extraordinary General Meeting will be held to consider, and, if approved, to pass, with or without modification or alteration, as the Meeting may think fit the following Resolutions by way of alteration of, or addition to, the regulations of the Company now in force—that is to say:

That the regulations of the Company be modified and altered in the particulars following—that is to say:

(*a*) The 89th Article of Association shall be altered by adding to it the following clause:—

"Provided always that no such investments shall be made in any Shares or Stocks having any further liability attached to them."

(*b*) The 90th Article of Association shall be altered by adding to it the following clause:—

"Provided that the Directors may, if they think fit, in like manner declare, and order to be paid to the members, an interim Dividend out of the profits of the Company during the first six months in any year."

By order of the Directors,

ROD. MACKAY, Secretary.

2, Moorgate Street, E.C., March 11, 1870.

PHŒNIX GASLIGHT and COKE COMPANY.

NOTICE is hereby given that the adjourned HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to Christmas last £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 6th proximo, at Twelve for One o'clock, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 31st of December last, to elect Directors and Auditors for the ensuing year, and on other business.—By order of the Court of Directors,

ISAAC ADOLPHUS CROOKENDEN, Secretary.

70, Bankside, London, S.E., March 14, 1870.

All the Directors retire, but seven are to be re-elected; the remaining three, likewise the Auditors, offer themselves for re-election. The qualification is £2000 capital held for more than three months, and notice fourteen days prior to the Meeting.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that an ORDINARY MEETING of the PROPRIETORS of this Company will be held at the London Tavern, in the City of London, on MONDAY, the 4th day of April next, at Two o'clock precisely, to receive the Directors Report, and the Accounts of the Company for the half year ended December 31 last, to declare a Dividend for the same period, and to elect a Director in the place of William Baker, Esq., and an Auditor in the place of Frederic Simpson, Esq., who retire from office at this Meeting, but, being eligible, offer themselves for re-election.

Any Proprietor, holding 40 shares, intending to become a candidate for either of these offices, must give notice in writing at the Office of the Company at least 14 days previously to the day of election.—By order,

THOMAS LIVESEY, Secretary.

Old Kent Road, March 12, 1870.

COMMERCIAL GAS COMPANY.

NOTICE is hereby given that the next ORDINARY MEETING of the Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on FRIDAY, the 1st day of April next, at Twelve o'clock at Noon, to receive the Report of the Directors, and to declare a Dividend to the 31st day of December last.

The following Directors—viz., Charles Salisbury Butler, James Holbert Wilson, and Griffith Thomas, Esqrs.—will go out of office by rotation, who, being eligible for re-election, offer themselves accordingly; and the Board of Directors unanimously recommend those gentlemen to the Proprietors for re-election. George Ilsley, Esq., Auditor, will go out of office by rotation, who, being eligible, has given notice of his intention to offer himself for re-election.

The Books of the Company will be closed for the Transfer of Shares from the 17th day of March to the 1st day of April now next ensuing.

By the Company's Act of Incorporation, Shareholders can inspect the Books of the Company during one fortnight before and one month after the Meeting.

By order of the Board,

GEORGE JAQUES, Secretary.

Stepney, March 9, 1870.

TO GASHOLDER BUILDERS.

THE Directors of the Warrington Gas

Company are prepared to receive TENDERS for the erection of a TELESCOPE GASHOLDER, 95 ft. diameter and 40 ft. high, with the necessary suspension columns, guides, girders, &c., in conformity with plans and specifications to be seen at the Offices of the Company.

Sealed tenders, addressed to Benjamin Pierpoint, Esq., Chairman of Directors, St. Austin's, Warrington, must be delivered on or before Thursday, the 31st proximo.

The directors do not bind themselves to accept the lowest or any tender. JAMES PATERSON, Engineer.

Gas Company's Offices, Mersey Street, Warrington, Feb. 25, 1870.

CLIMPY CANNEL COAL.—

Gas per ton, 12,488 cubic feet; illuminating power, 32·59 candles. Coke excellent.

WILSONTOWN CANNEL COAL.

Gas per ton, 10,810 cubic feet; illuminating power, 28·41 candles. Coke very good.

Shipping ports, Granton, Firth of Forth, and Glasgow.

Agent, ROBERT SMALL, Coal Factor, Yeamen Court, DUNDEE.

PIRNIE or METHILL CANNEL COAL.

This Cannel forms a good substitute for Boghead Coal, either for gas or oil making. The yield per ton is 10,827 feet of 32-candle gas, or 56 gallons of crude oil.

Ports of Shipment, Methill, Burntisland, and Tayport.

Apply to J. W. KIRKBY, Manager, Pirnie Colliery, Leven, FIFE.

INTERNATIONAL EXHIBITION, 1862.

CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE, SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

HANCOCK'S INDIA-RUBBER GAS-TUBING.

All sizes, from ⅛ in. to 4 in. diameter and upwards.

Also,

HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.

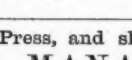
INDIA-RUBBER BAGS for GAS-MAINS.

WASHERS for GAS and STEAM JOINTS.

VALVES (pure solid Rubber) for STEAM-ENGINES.

PACKING (Elastic) for STEAM-ENGINES.

FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.



Section.

Illustrated Price Lists on application.

JAMES LYNE HANCOCK,

Vulcanized India-Rubber Works,

GOSWELL MEWS, AND 266, GOSWELL ROAD, LONDON, E.C.

J. BROWN, having disposed of his works

to the Waltham Abbey and Cheshunt Gas Company, in accordance with their Act of Parliament, is desirous of Leasing or Purchasing Gas-Works, or would undertake the Management where the remuneration depended on results.

8, OSBORNE VILLAS, West Green Road, TOTTENHAM, N.

THE

HUCKNALL COLLIERY COMPANY

Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

ROBERT MACLAREN and CO.,

EGLINTON FOUNDRY, GLASGOW,

Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

CATHELS'S Patent District Dry Gas-

GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS'S Patent Four-way Disc Gas-

VALVE—ONE OF WHICH SERVES AS THREE ORDINARY VALVES—is the best Valve for Gas-Works.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS'S Patent Ribbed Gas Main-

PIPES cost but about 1d. to 2d. per yard (depending on the size) more than Plain Pipes, and ensure PERFECT GAS-TIGHT CONNEXIONS with the Service-Pipes.

Apply to Messrs. BEGGS & SON, 37, Southampton Street, Strand, LONDON.

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GAS ENGINEER, CONTRACTOR, & FITTER,

7, UNETT STREET, ST. GEORGE'S,

BIRMINGHAM.

SOLE AGENT TO

GEORGE SKEY AND COMPANY,

LIMITED,

WILNECOTE WORKS,

Near TAMWORTH,

FOR

FIRE-CLAY GAS-RETORTS,

and all kinds of

Fire Goods required by Gas Companies.

In the Press, and shortly will be Published,

THE GAS MANAGERS' HANDBOOK

OF

TABLES, RULES, AND USEFUL INFORMATION

FOR

GAS ENGINEERS, MANAGERS,

AND OTHERS ENGAGED IN THE

MANUFACTURE AND DISTRIBUTION OF COAL GAS.

By THOMAS NEWBIGGING.

Price to Non-Subscribers, 7s. 6d., by post 8s.; to Subscribers, 6s., by post 6s. 6d.

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WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

SAMUEL CUTLER & SON,

CONTRACTING GAS ENGINEERS, &c.

MANUFACTURERS OF GASHOLDERS, TANKS, PURIFIERS,

AND ALL DESCRIPTIONS OF GAS-MAKING APPARATUS.

Iron Roofs, and General Iron Work. Mains Supplied and Laid.

S. C. & SON supply every requirement for a Gas-Work, and keep in stock Retort-Lids, Cotters, Barrows, Scoops, Bolts and Nuts, &c., &c.

PROVIDENCE IRON-WORKS, MILLWALL, LONDON, E.

GEORGE ORME & CO.,

MANUFACTURERS OF

CONSUMERS GAS-METERS, STATION-METERS, GOVERNORS,

PRESSURE & EXHAUST REGISTERS,

PRESSURE-GAUGES, MINUTE-CLOCKS, PHOTOMETERS,

INDICES FOR GAS AND WATER METERS,

INDICATORS,

FITTINGS FOR RAILWAY CARRIAGES AND LAMPS

AND EVERY DESCRIPTION OF

GAS, STEAM, & WATER FITTINGS,

ON THE MOST APPROVED PRINCIPLE.

WORKS: PARK STREET, OLDHAM.

LAMBERT BROTHERS, WALSALL.

ALPHA TUBE & FITTING WORKS

Union Jet Economizer, 1-10th real size of Flame.

PATENT ECONOMIZERS

ADAMAS-POINTED.

Bat's-wing Economizer, 1-10th real size of Flame.

N.B.—All Sizes are Reduced 3s. per Gross. Second Quality ditto also Ready for Delivery.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short notice.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

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WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

CAROLINE VICKARY,

(ADMINISTRATRIX TO THE LATE JOHN VICKARY,)

GAS ENGINEER, CONTRACTOR, IRON AND BRASS FOUNDER,

EXE ISLAND, EXETER,

(Established Thirty years,)

Respectfully tenders her thanks to those friends who have patronized her since her late husband's death, and having secured an efficient staff for each department of design and manufacture, she refers with confidence to works recently erected by her as a guarantee that all orders she may be favoured with will be completed in a sound and satisfactory manner.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Sluice-Valves of all kinds. (Gas and Water Mains always in stock.)

GAS-FITTINGS,

Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs, embracing the Mediæval and other periods.

GAS-METERS (WET OR DRY),

Combining the most recent improvements in principle and manufacture; upwards of 150,000 already in work, giving the highest satisfaction. (A guarantee for five years given with each one.)

Every description of **Plumbers Work**, comprising **Water-Closets, Beer-Engines, Lift and Force Pumps, Cocks for Gas, Water, or Steam, &c.**

Drawings, Specifications, and Estimates of **Gas-Works, Iron Roofs, Bridges,** and light or heavy structures in wrought or cast iron, supplied on application.

CANNEL COAL.—The West Yorkshire Iron and Coal Company, Limited, beg to draw the attention of Gas Companies to their Cannel, of which the following is the analysis made by W. Huggon, Esq., F.C.S.:

Yield of gas per ton	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
Yield of coke per ton . . .	12 cwt.

The actual working, as reported by one of the largest gas companies in Yorkshire, gives results still more favourable, viz.—

Yield of gas	10,416 cubic feet.
Illuminating power	21·89 sperm candles.
Coke	The same.

We add from the same source the capabilities of the common gas coal—

Yield of gas	10,080 cubic feet.
Illuminating power	14·41 sperm candles.
Yield of coke	13 cwt.

COLLIERIES—WEST ARDSLEY, near LEEDS.

For further particulars, address to the Office of the Company, 15, York Place, LEEDS.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles.*

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

OLD WEMYSS CANNEL COAL.—Yield of gas per ton, 12,896 cubic feet; illuminating power, 31·75 standard candles. Port of shipment, Wemyss.

Analysis and price on application to MR. WM. CAREY, Manager, Wemyss Colliery, Kirkcaldy, FIFE.

CANNEL COAL.

MESSRS. GRIFFITHS BROTHERS,
COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for gas-making purposes.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to GRIFFITHS BROTHERS, Coppa Colliery, Mold, FLINTSHIRE.

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FIRE-BRICKS, LUMPS, TILES, RETORTS,
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SCOTSWOOD FIRE-BRICK WORKS,
NEAR
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Manufacturers of all kinds of
GAS AND WATER PIPES,
Branches, Bends, Water-Traps, Tank-Plates, Valves, and general Castings. Also
RAILWAY CHAIRS & SLEEPERS,
AND
GRIFFIN'S PATENT PERMANENT WAY.
London Office, 63, Old Broad Street.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
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BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101, Cannon Street, E.C.

WALTER MABON & CO.,
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ARDWICK IRON-WORKS,
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IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
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DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

FIRE-CLAY GAS-RETORTS, &c., CANNEL AND STEAM COALS.

WILLIAM FRASER, Inverkeithing (owner of the Works at which Fire-Clay Retorts were first made), having greatly enlarged his Works, can supply Retorts and other Fire-Clay Goods to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

WILLIAM FRASER ships COWDENBEATH PARROT COALS at Charlestown and Burntisland at 12s. per ton; and HALBEATH STEAM COALS, on Navy List, at 8s. 6d. per ton.

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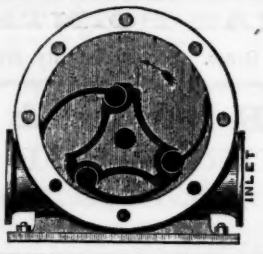
MANUFACTURER OF
WET & DRY GAS-METERS, STATION-METERS, GOVERNORS, &c.
SOLE MANUFACTURER OF
PADDON'S PATENT STREET-LAMP REGULATORS,
For ensuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.



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GAS EXHAUSTER.
(From 250 Feet upwards per Hour.)
Also,
ROTARY TAR AND OIL PUMPS.
For particulars and prices apply to the Patentee,
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COLCHESTER, ESSEX,
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Mr. Fraser having had more than Twenty years experience in the Construction, Alteration, and Management of GAS and WATER WORKS, will be happy to furnish information on all matters appertaining thereto.

Plans, Specifications, and Estimates prepared.

ROBERT DEMPSTER,
Gas Engineer and Contractor, Rose Mount Foundry, Elland, near Halifax.

R. D. recommends his Fire-Brick Retorts to Engineers and Managers of Gas Companies; they last from 10 to 12 years.

Iron and Fire-Clay Retorts.	Wrought-Iron Tubes, Water Tanks.
Annular and Pipe Condensers.	Wrought-Iron & Cast-Iron Roofs.
Scrubbers and Purifiers, all sizes.	Gasholders, Single-Lift or Telescopic.
Steam-Engines and Exhausters.	Gas Castings of every description.
Hydraulic Centre-Valves.	Retort Setters and Fitters sent to all parts of the country.
Station-eMters and Governors.	Wood Sieves for Purifiers.
Photometers & Pressure-Gauges.	
Lamp-Posts and Brackets.	
Cast-Iron Mains and Syphons.	

Plans and Specifications prepared.

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GAS ENGINEERING WORKS, EXETER,
CONTRACTORS FOR THE ERECTION OF GAS-WORKS,
MANUFACTURERS OF IMPROVED WET & DRY METERS;
Also, EVERY DESCRIPTION OF GAS APPARATUS,
Comprising GASHOLDERS, STATION-METERS, GOVERNORS, CONDENSERS, PURIFIERS, RETORTS, SLIDE-VALVES, and every article appertaining to Gas-Works.
Gas Companies advised on Improvements, Extensions, and Alteration of Works.
*** The very best material and workmanship guaranteed, and at prices bearing a favourable comparison with any House in the Kingdom.

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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2, KING EDWARD STREET,
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Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gas-Fittings and Gas Apparatus.

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MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.
BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers, and wholesale of

JOHN SCHOLL, 41 & 42, BERWICK STREET, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

TO GAS COMPANIES & LOCAL BOARDS.

KEEN'S PATENT DOUBLE-CLIP STREET-LAMP.

TESTIMONIAL.

"Dear Sir,—I am very pleased to say we are quite satisfied with your Patent Lamps, and consider them to possess decided advantages over the ordinary Street-Lamps; and although we cannot undertake to throw out of use our existing old-fashioned Lamps, we purpose applying yours to all new columns, as well as replacing the old ones found to be worn out.

(Signed) "JOHN READ, Secretary.

"*Tunbridge Wells Gas Company, Dec.* 13, 1869."

For particulars of price, &c., apply to

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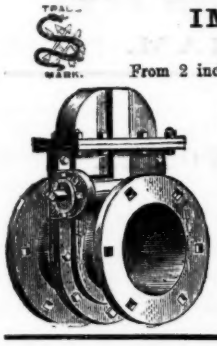

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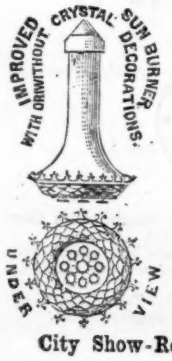

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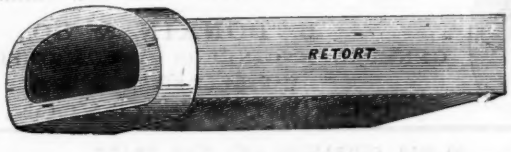

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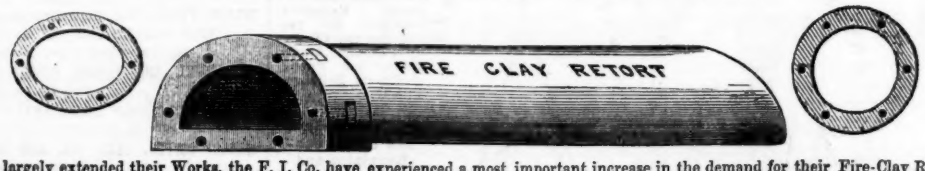

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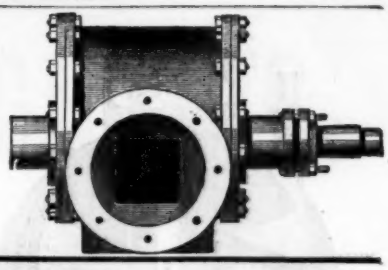

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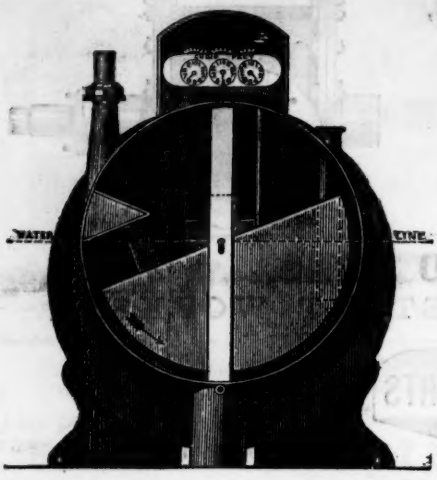

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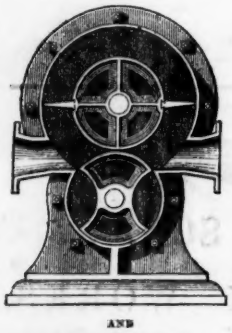

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